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CONTENTS

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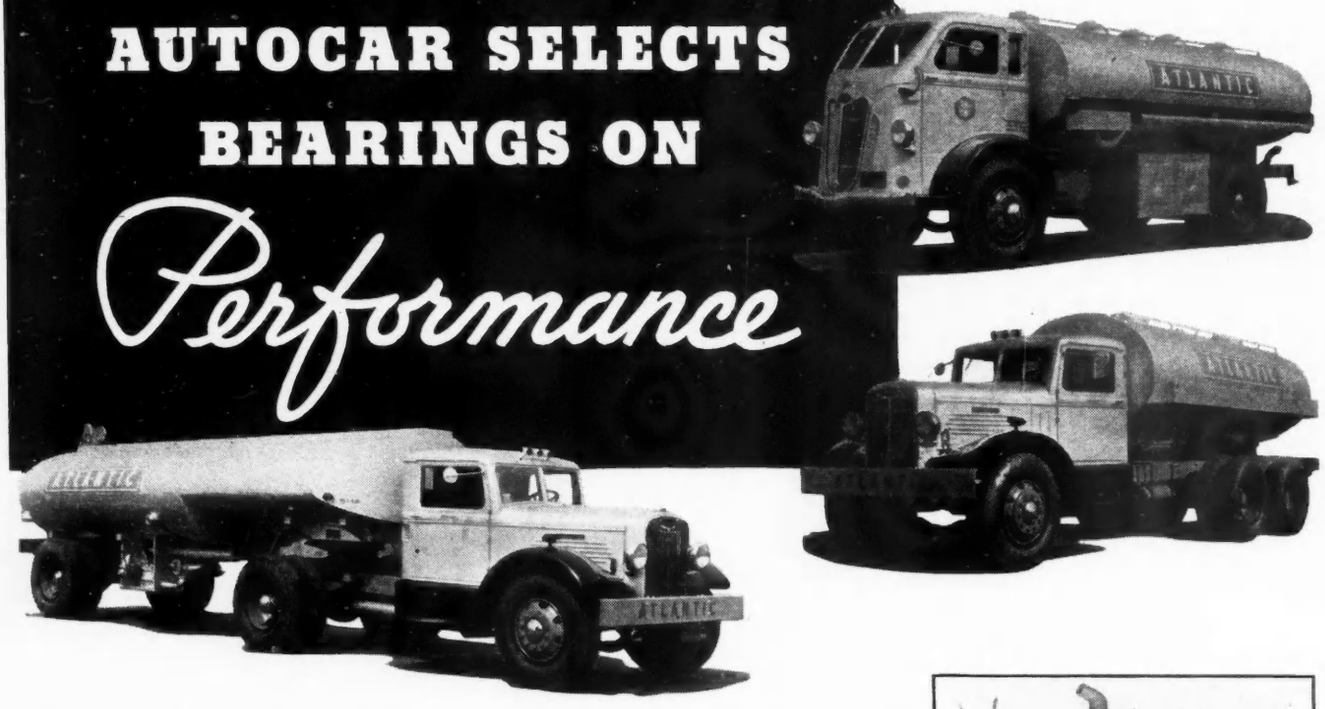
AUTOCAR SELECTS BEARINGS ON *Performance*



That's Why FEDERAL-MOGUL BEARINGS Are Standard on AUTOCAR Gasoline Engines

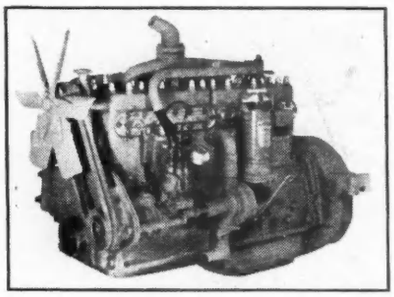
TRUCK operators, the most discriminating and "hard boiled" buyers of the automotive field, show a big preference for Autocar trucks and truck trailers.

They have found that Autocars will stand up under gruelling punishment of road, load and weather—and that's what a trucker needs.

Likewise, Autocar has found that Federal-Mogul bearings perform their vital service in Autocar gasoline engines with the same dependable efficiency in the most severe service.

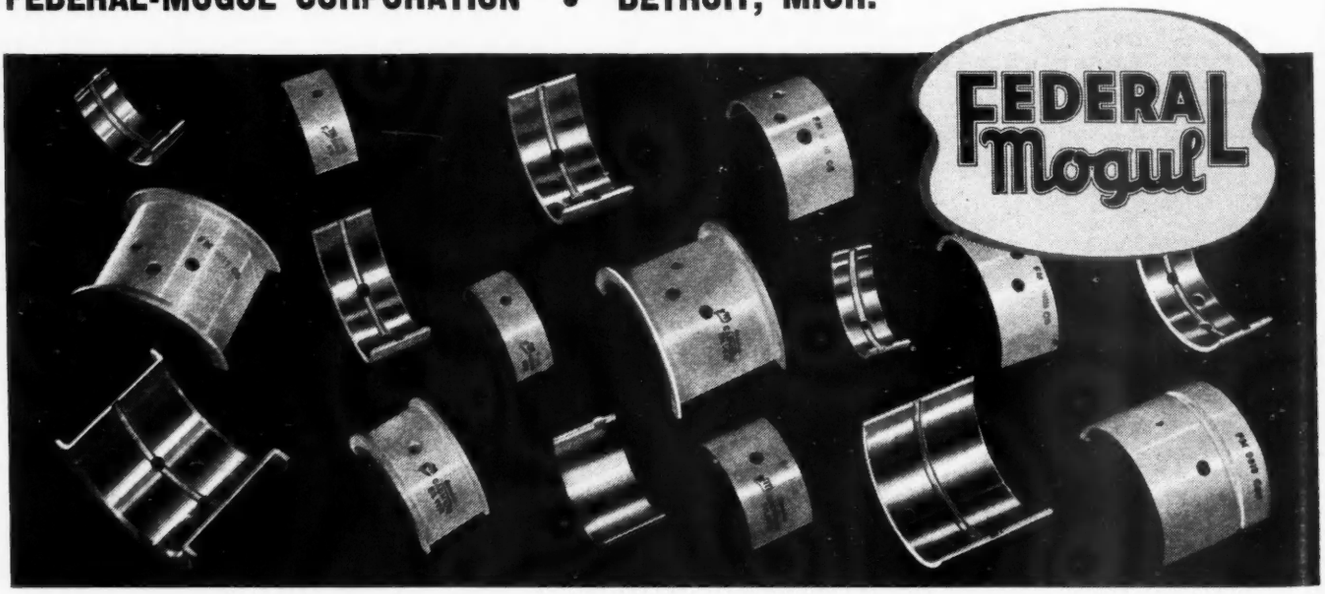
Failure of one vital part, such as a bearing, means tying up the truck in the shop. Bearings built for heavy-duty truck service assure maximum, trouble-free continuous operation. Because Federal-Mogul KNOWS the needs of this gruelling service, and designs and manufactures bearings to fit these needs, Federal-Mogul bearings are the choice of Autocar and other leading commercial vehicle manufacturers.

Forty years' specialization in bearing production and an intimate practical knowledge of engine bearing problems result in Federal-Mogul bearings having those extra qualities of dependability and long life essential to fine truck performance.



The complete Federal-Mogul line includes: Steel-Back, Babbitt-Lined Bearings; Steel-Back, Cadmium-Silver-Alloy-Lined Bearings; Dualoy (Steel-Back, Babbitt-Lined) Camshaft Bearings; Bronze-Back, Babbitt-Lined Bearings; Bronze Bushings and Bronze Washers; Bronze Castings; Aluminum Bronze Castings; Bronze Cored and Solid Bars; Babbitt Metals; Marine and Industrial Propellers.

FEDERAL-MOGUL CORPORATION • DETROIT, MICH.



AUTOMOTIVE INDUSTRIES

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Aug. 1, 1939

People Packing the Panoramas

Automotive Exhibits at New York World's Fair Put Sex Shows to Shame

By LESLIE PEAT

THE historically-successful "midway" attractions of world's fairs—from Little Egypt of '93 to Sally Rand of '39—are playing second fiddle to industrial shows—particularly automotive—at the New York World's Fair.

Standing room only meets mile-long queues at the General Motors', Ford, Chrysler, Firestone, Goodrich, Petroleum, and Aviation buildings. From 9:30 or 10 in the morning until ten o'clock at night, every day of the week, thousands of men, women, and children are getting a glimpse of the future, and seeing how automobiles, tires, gasoline and oil, and accessories are manufactured.

Interest is tense at the B. F. Goodrich exhibit. These visitors are watching Jimmie Lynch at his stunts

Experienced showmen of the amusement area of the Fair look with amazement across Flushing Meadows and are chagrined at the showmanship of Norman Bel Geddes, Walter Dorwin Teague, Albert H. Kahn, Inc., and automotive advertising executives.

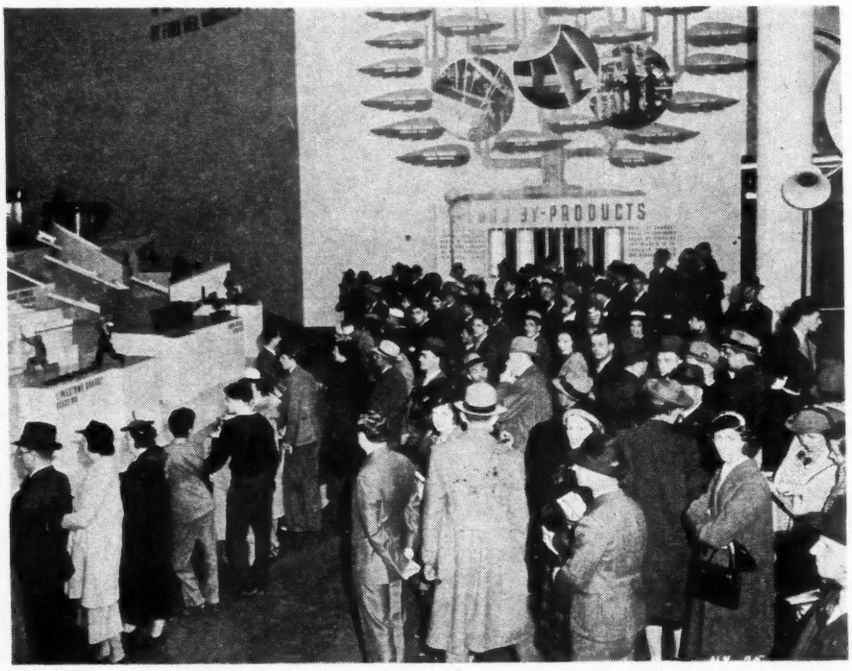
Ford reports that about 34 per cent of the Fair's paid attendance crowds into its buildings, fine days and rainy days alike. The half-mile "skyway" ramp to the top of the building keeps the 32 new cars busy far into the night, and several millions of pairs of feet have shuffled through the elaborate exhibit space where a museum of the motor car's yesterday and display of today's achievements offer top-flight entertainment.

General Motors' "futurama" has been a smash hit ever since the opening morning of the Fair. A recent Gallup survey gave it first place in popularity. About a half million people a week visit the G.M. buildings. The "futurama" handles 2,200 an hour, or 27,000 a day, and has been running at capacity. The G. M. research exhibit "clocks" about 2,000 an hour, and the lecture hall, with a capacity of barely 700, handles something like 8,400 a day with twelve shows. Thirteen million people will have seen the G. M. exhibit by October 31, the end of the Fair.

Nearly 2,500,000 people have visited the Chrysler exhibit, and the three-dimensional moving picture showing the assembly of an automobile has been playing to capacity audiences with long waiting lines. Some 500,000 have seen this showing already.

Firestone Tire & Rubber Co. is running close to 20 per cent of the Fair's paid admissions, and during the first 10 weeks 1,761,644 were "clocked," or more than 25,000 a day. A continuous line, often more than 25 people deep, walk slowly around an amphitheatre in the building watching the actual production of tires.

The Aviation building, although late in opening, is playing to its capacity—more than 35,000 a day. More



A 150-ton turn table slowly revolving unfolds the story of materials and processes that go into the making of a Ford automobile

The table is 30 ft. high; 100 ft. in diameter at the base and has 142 human figures at different operations. It is floated in water

than 25,000 a day get a close-up of the exhibit's mockup, a full sized replica of the Curtiss-Wright CW—20 substratosphere airliner. Army and navy aircraft, explained by officers and men of the services, are another feature attraction of the Aviation building.

More than 2,000,000 people have seen Jimmy Lynch's stunting, in which he demonstrates the stamina of Goodrich tires and safe handling of automobiles.

The Petroleum Building accounts for about 15 per cent of the Fair's total paid admissions, and the capacity of the building's moving picture is taxed to capacity for 11 shows a day. This is offered as an educational exhibit by 15 leading refiners.

Automotive exhibits are by no means alone in offering interesting educational shows, as the popularity of the Telephone building, Borden's dairy, Food buildings, glass blowing, Metals building, electrical manufacturers, U. S. Steel building and other industrial showings. But in spite of the attraction of these exhibits and the dramatic shows of many of the buildings of nations and states of the union, crowds line the walks around the automotive buildings from the first surge of opening time until the exhibit closes at 10 p. m.

Henry Ford's dream of motorized transportation was stimulated by an exhibit of a water pump, driven by a small gasoline engine, mounted on a horse-drawn vehicle. This early fire engine, seen at a fair, set him to work with about a dollar's worth of gas pipe (the cylinder) and a wheel from a lathe (the fly-wheel) and other scraps which he built into an experimental engine. It ran only a minute and a half, with Mrs. Ford's aid in feeding it gasoline from an oil can, but it played a leading role in establishing today's giant industry. It was natural, then, that Mr. Ford showed America his new car at fairs in 1903. Since then the Ford Motor Co. has been loyal to fairs, as have other motor car builders.

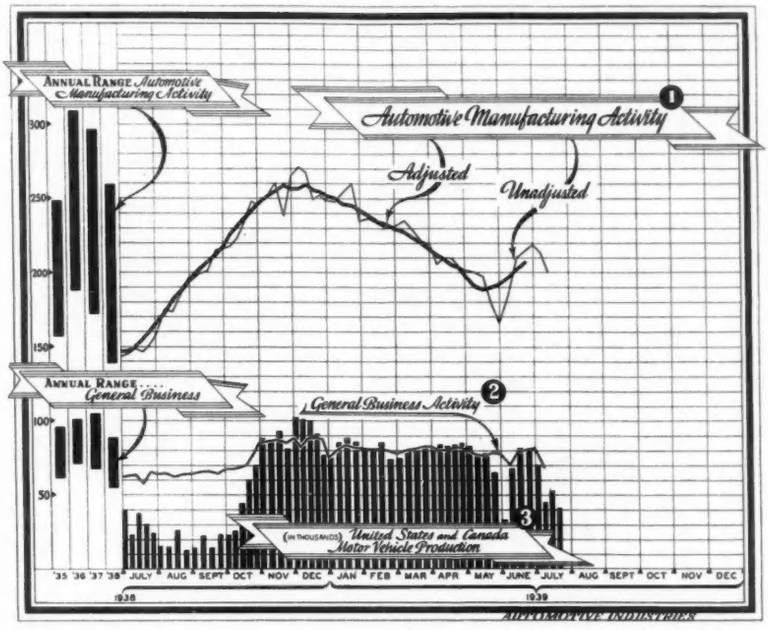
The World's Fair has been a haven for the camera men and there is a selection of views of automotive interest which appear on page 128.

The Brass-Hat Rack

"The parts makers each want a credit line under our name on the hub caps!"

BUSINESS IN BRIEF

Our own view of automotive production and sales; authoritative interpretation of general conditions



Weekly indexes of automotive and general business charted

Industry Set for 1940 Models

PRODUCTION of 1939 passenger cars virtually ceased at the end of July. Some truck production will be continued for a number of weeks with the possibility that output totals will be augmented by some passenger car assemblies which will overlap with beginning of final assemblies on 1940 models. Preliminary estimates[1] of car and truck production for the week ending July 22 indicated that the industry turned out approximately 41,000 units. With an output of 30,000 more units anticipated for the final week in the month it is estimated that production for the entire month will be fairly close to 180,000 cars and trucks.

Totals for the week ending July 22 and the succeeding week include several hundred 1940 models finished at Packard, which company is already underway on its new-car program, although it will be several weeks before announcements are made. AUTOMOTIVE MANUFACTURING ACTIVITY, as indicated by the charting of the unadjusted index[1], has turned downward with figures of 214 and 200 being marked up for the weeks ended July 8 and July 15, respectively. The adjusted curve[1], however, continued climbing upward to 202 for the week ended June 17 and 207 for the week ended June 24.

GENERAL BUSINESS ACTIVITY[4] continued to show "moderate improvement." Movement of railway freight during the week ended July 8 showed the curtailment that was to be expected in consequence of the interruptions incident to holiday observance. Loadings totaled 559,109 cars registering a decline of 16 per cent from the figure for the preceding week, but an advance of 11.6 per cent above that for the similar period a year ago.

Electric power production during the week ended July 8, reversing the trend shown in each of the preceding four weeks, fell to a level 10.5 per cent above last year's comparable output as compared with a similar excess of 14.2 per cent recorded for the week before bank debits to individual accounts in leading cities during the week ended July 5 were 2 per cent below the total reported for the preceding week and about equal to that for the comparable week last year.

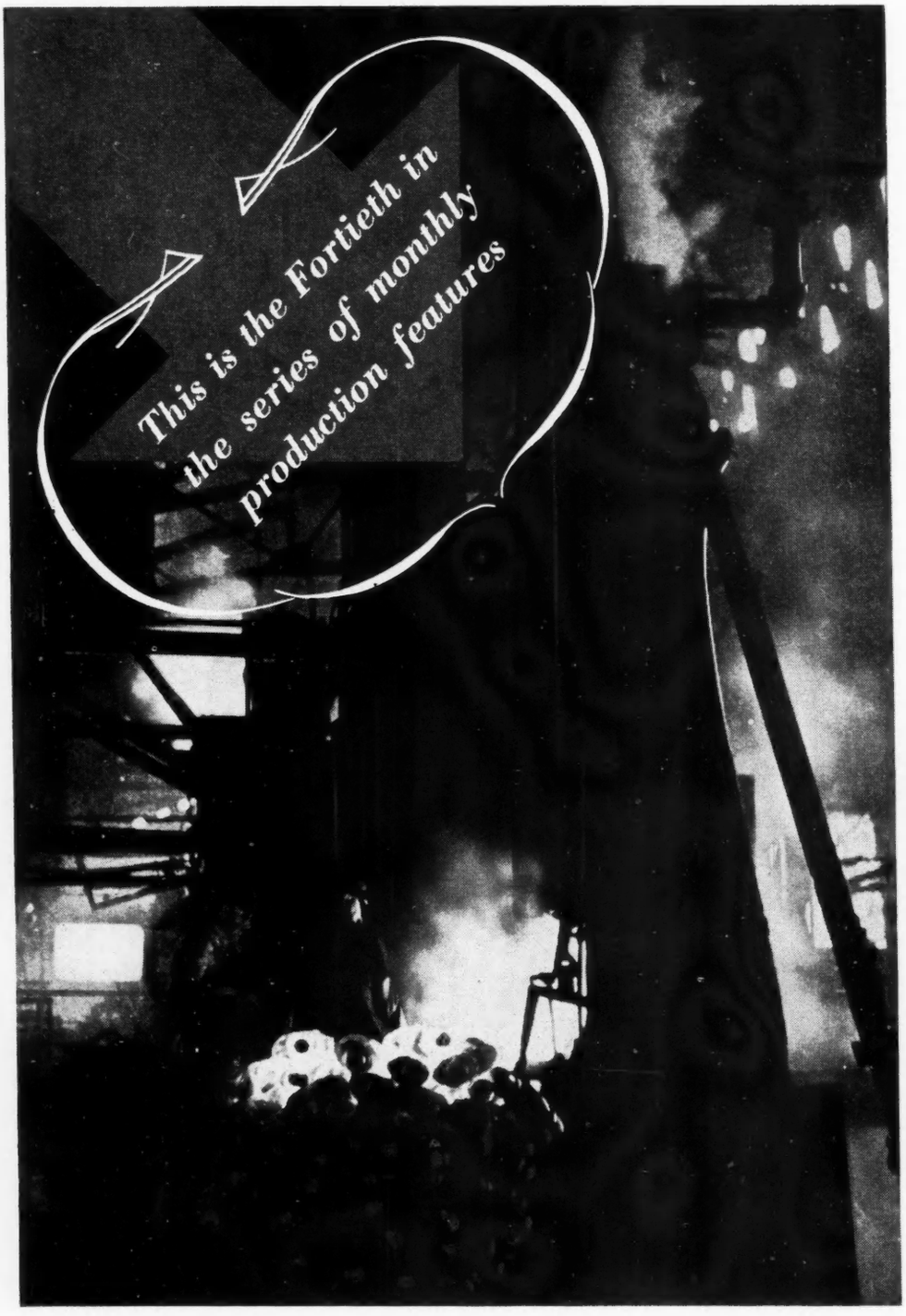
Crude oil production increased further during the week ended July 8 rising slightly above the level of current requirements as computed by the Bureau of Mines. Output averaged 3,529,800 barrels daily as compared with an average of 3,463,000 barrels for the preceding week and 3,296,250 barrels a year ago.

Engineering construction contracts awarded during the week ended July 13 exceeded by 23 per cent last year's comparable total. According to *Engineering News-Record* the cumulative total for the year to date is 19.5 per cent above the corresponding 1938 figure.

Professor Fisher's index of wholesale commodity prices declined last week, standing at 78.7 per cent of the 1926 average as against 79.2 a week earlier and 78.8 two weeks earlier.

The General Motors-Cornell World Price Index of 40 basic commodities for the week ended July 8 was reported at 61.0, compared with the previous week's figure of 61.1.

[1] 1923 average = 100; [2] Prepared by Administrative and Research Corp., New York. 1926 = 100; [3] Estimated by J. A. Laansma, Detroit News Editor, AUTOMOTIVE INDUSTRIES. [4] Summarized for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Co. of New York.



By JOSEPH GESCHELIN

EVOLUTION of automotive crankshaft manufacture has been so gradual, so subtle in some respects, as to make a discussion of current practice of value to engineers and production executives alike. And in retrospect it is possible to note many fundamental changes in forging practice, in production equipment and techniques.

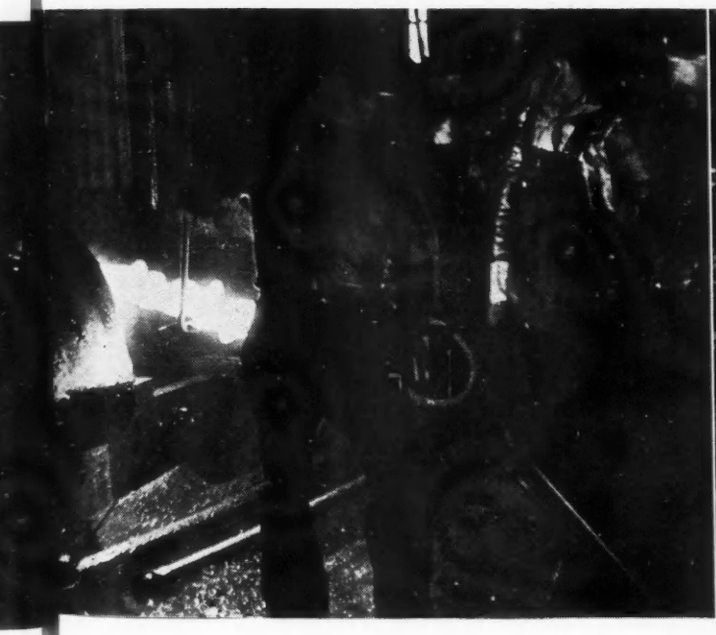
That forging practice has made notable gains, may be gaged by examining the procedures of certain specialists of whom Atlas Drop Forge and Wyman-Gordon are representative. Close metallurgical controls, advanced die design, and engineering experience founded upon many years of specialization all have combined to place the art on a high plane of accomplishment. To the specialist, it is a matter of almost routine practice to produce crankshafts of any size with accurately located counterweights forged integrally. Skillful disposition of metal coupled with good die design makes possible a better rough balance with a minimum of straightening operations while in process.

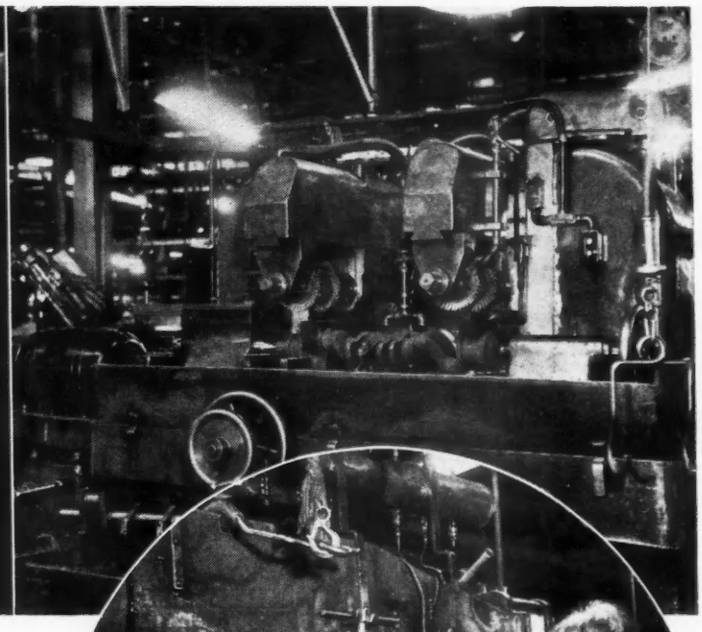
Important by-product of these engineering advances

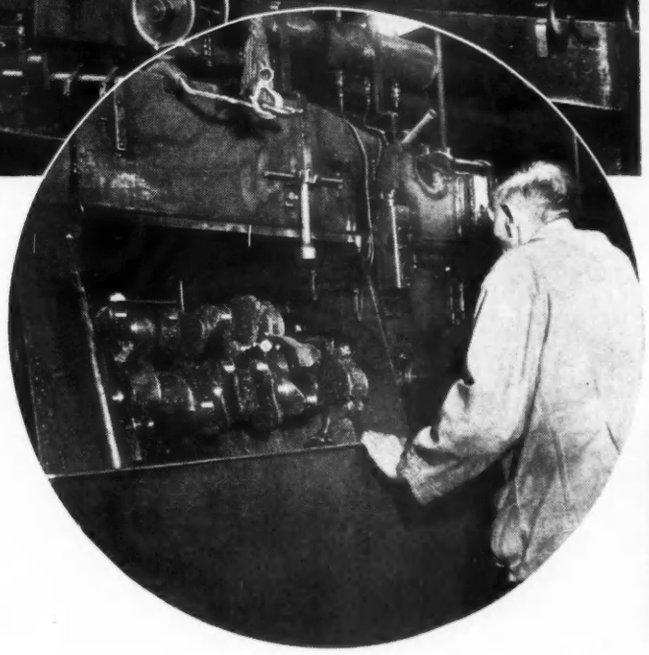
Crankshaft Production

has profited from improved equipment and procedures. Straightening and balancing operations reduced to minimum

Below and on the facing page are two pictures from the Atlas Drop Forge Co. showing heavy crankshaft forges. At the right a Producto-Matic heavy duty milling machine mills variety of locating spots in Packard crankshafts, in one setting. In the circle is shown a six-station Natco drilling and tapping machine used at Packard for all drilling, tapping, reaming, etc., on both ends.







is the ability to forge cranks with less excess metal and with a draft angle of only three degrees as compared with the time-honored draft of seven degrees. In certain establishments this has produced a major reduction in the amount of metal removal for balancing.

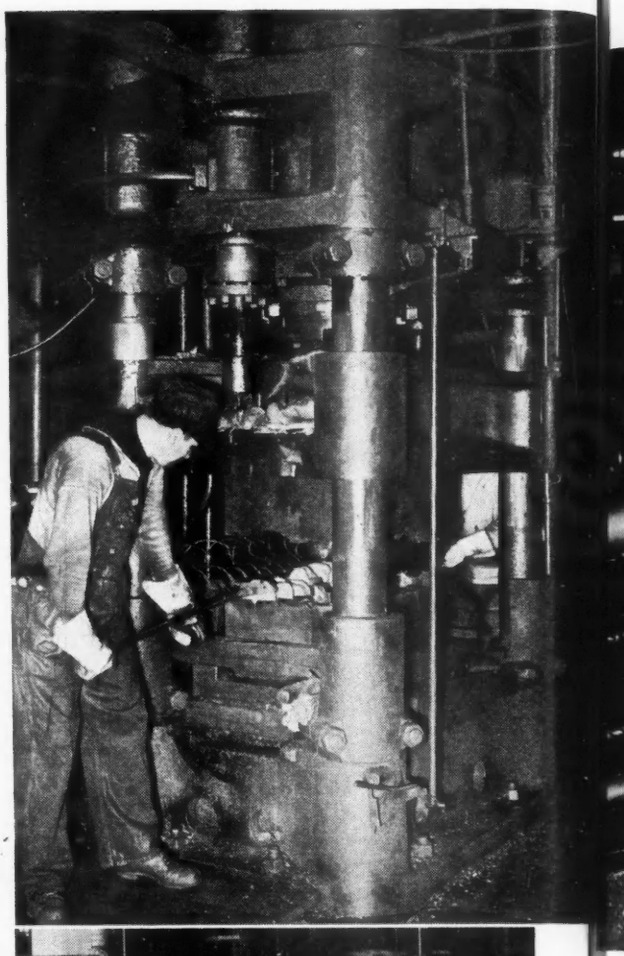
Machine shop practice also has profited by improvements in equipment and procedures. Several of these are worthy of special mention. Perhaps the most important detail is the milling of multiple locating spots which serve as an accurate means of alinement in fix-

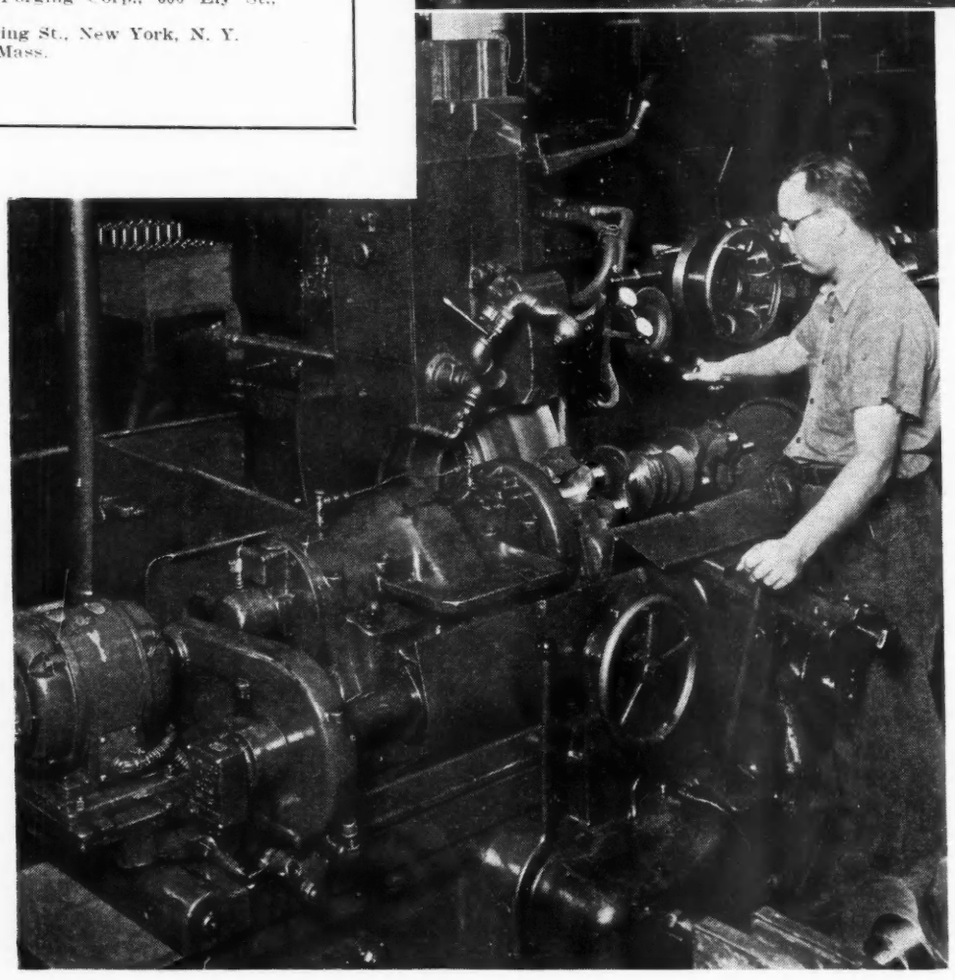
Table 1 Crankshafts, Finished

Atlantic Basin Iron Works, 168 Van Brunt St., Brooklyn, N. Y.
Carpenter Gear & Engine Co., Bates & McKee Place, Pittsburgh, Pa.
Continental Motors Corp., Muskegon, Mich.
Jackson Crankshaft Division of Muskegon Motor Specialties Co., Tyson St. & M. C. Belt Line, Jackson, Mich.
Ladish Drop Forge Co., Packard Ave., Cudahy, Wis.
Muskegon Motor Specialties Co., Div. of Houdaille-Hershey Corp., Seventh & Larch Sts., Muskegon, Mich.
Ohio Crankshaft Co., 6600 Clement Ave., Cleveland, Ohio.
Park Drop Forge Co., 730 E. 79th St., Cleveland, Ohio
Wohlert Corp., 700 E. Grand River Ave., Lansing, Mich.

Table 2 Crankshafts, Forgings

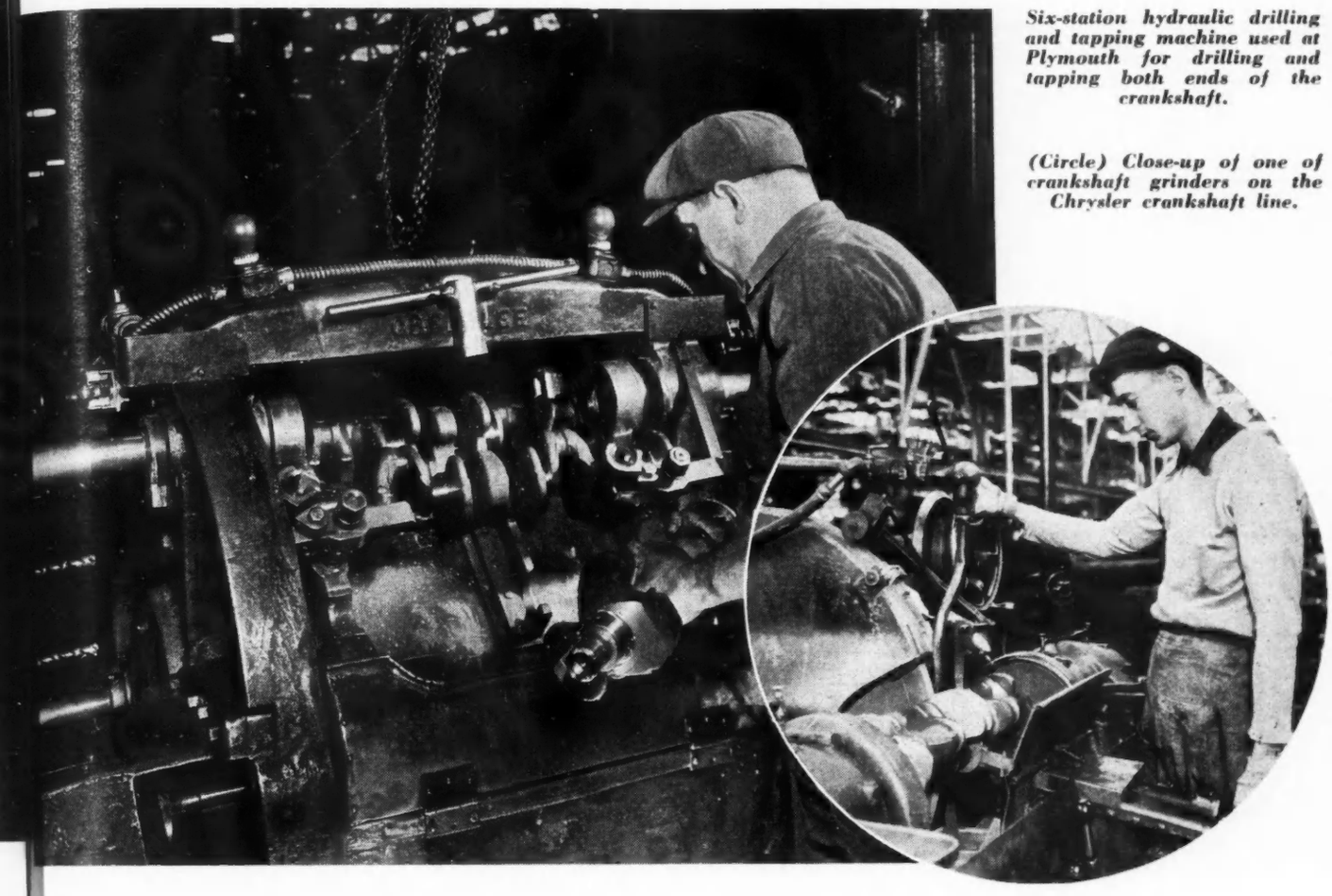
Atlantic Basin Iron Works, 168 Van Brunt St., Brooklyn N. Y.
Atlas Drop Forge Co., 209 W. Mt. Hope Ave., Lansing, Mich.
Bethlehem Steel Co., Bethlehem, Pa.
Canton Drop Forging & Mfg. Co., 207 12th St., S. E., Canton, Ohio.
Champion Machine & Forging Co., 3695 E. 78th St., Cleveland, Ohio
Fallen Drop Forge Co., Manistee, Mich.
Finkl & Sons Co., A., 2011 Southport Ave., Chicago, Ill.
Great Lakes Forge Co., 612 N. Michigan Ave., Chicago, Ill.
Ingalls-Shepard Div. Wyman Gordon Co., 147th St. & Page Ave., Harvey, Ill.
Ladish Drop Forge Co., Packard Ave., Cudahy, Wis.
Lansing Drop Forge Co., Logan & Albert Sts., Lansing, Mich.
Leard Co., William, Fifth Ave. & 16th St., New Brighton, Pa.
Park Drop Forge Co., 730 E. 79th St., Cleveland, Ohio.
Steel Improvement & Forge Co., 960 Addison Rd., Cleveland, Ohio.
Transue & Williams Steel Forging Corp., 600 Ely St., Alliance, Ohio.
Williams & Co., J. H., 75 Spring St., New York, N. Y.
Wyman-Gordon, Worcester, Mass.





(Top) "Setting" crankshaft forgings on 800-ton Chambersburg hydraulic press in Buick forge shop.

One of the new Landis hydraulic grinders, part of a large battery installed in the IHC engine plant.



Six-station hydraulic drilling and tapping machine used at Plymouth for drilling and tapping both ends of the crankshaft.

(Circle) Close-up of one of crankshaft grinders on the Chrysler crankshaft line.

tures for turning and grinding, with a consequent improvement in quality and fabrication costs. This may be credited to the availability of the massive milling machines fitted with multiple heads to permit the cutting of a variety of locating spots in one setting. Mass centering of the rough forging is a basic improvement offering upward of 60 per cent reduction in final balance machining. The unique balancing machine for this purpose is a product of the General Motors Research Laboratories, first applied in production at Buick.

Recent years have seen the growing adoption of another basic process—Tocco hardening—currently used by Packard, White, Waukesha, and other engine builders.

This article is based primarily upon a survey of practice of many engine builders including a group of eight manufacturers who have generously supplied machine shop routings of their cranks in current production. These routings, giving the sequence of operations as well as a description of the equipment for

Nash Crankshaft Factory Routing

OPERATION	EQUIPMENT
Mill locating spots	DeVlieg mill
Rough turn No. 3, 4, 5 main bearings	LeBlond lathes
Rough turn front and rear ends and No. 2, 6 intermediate bearings	LeBlond lathes
Straighten	Flexible press
Rough grind center main bearings	Norton grinder
Rough grind No. 1 main bearing	Norton grinder
Rough grind No. 7 main bearing	Norton grinder
Shave No. 2, 3, 5, 6 main bearings	LeBlond lathe
Mill locating spots	Cincinnati mill
Rough turn all pins and cheeks	LeBlond lathe
Straighten	Flexible press
Rough grind No. 1, 6 pins	Norton grinder
Rough grind No. 2, 5 pins	Norton grinder
Rough grind No. 3, 4 pins	Norton grinder
Drill ¼ in. oil holes	Leland-Gifford drill
Drill 4 holes in flange	Aurora drill
Mill clearance in flange	Special Nash machine
Drill 2 holes in cheek	Moline duplex drill
Drill holes through pins	Barnes drill Natco drill
Straighten	Flexible press
Finish face flange	No. 6 Warner and Swasey turret lathe
Tap 4 holes in flange	Hoefer drill
Ream 6 oil tube holes	Leland-Gifford drill

Packard Crankshaft Factory

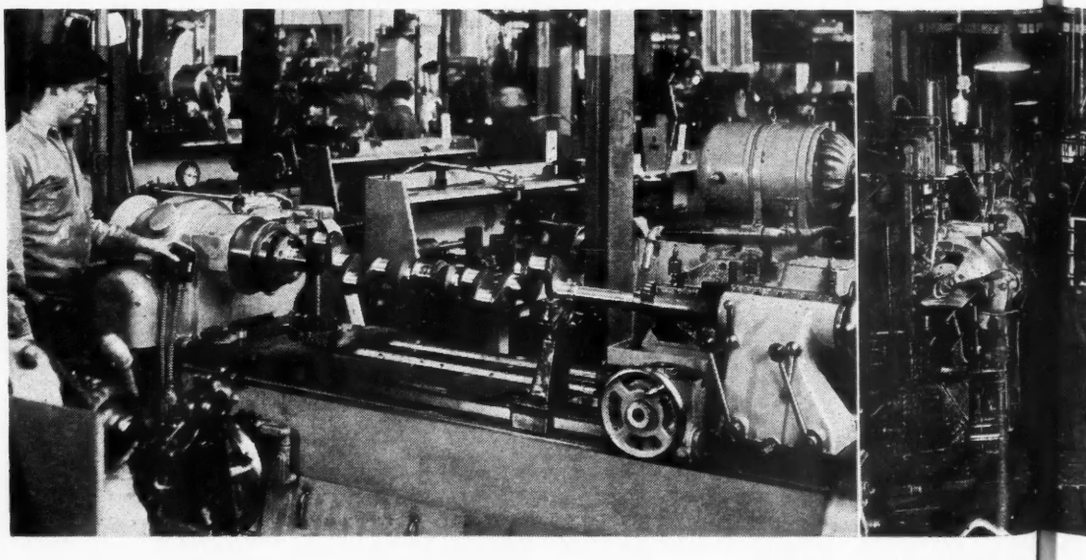
OPERATION	EQUIPMENT
Mill locating spot on cheeks No. 1 and No. 9, No. 4 and No. 6	Productomatic milling machine
Face all main bearing cheeks, rough face all main bearing walls. Rough flange, oil thrower and front end. Rough turn all main bearings front end, flange and oil thrower. Rough face both ends. Finish broach all main bearings and walls, flange and oil thrower front end.	Wickes semi-automatic main bearing crankshaft lathe
Rough and finish all pin bearings, walls and fillets	LeBlond pin turning lathe
Drill No. 22 oil holes in No. 1-4-6 pin bearings	Leland-Gifford drill press
Drill No. 22 oil holes in No. 2-3-5 pin bearings	Leland-Gifford drill press
Drill ¼ in. oil holes in No. 1-2-6 pin bearings	Leland-Gifford drill press
Drill ¼ in. oil holes in No. 3-4-5 pin bearings	Leland-Gifford drill press
Blow out oil holes	Air hose and nozzle
Straighten	Straightening fixture Thor balancer
Finish grind No. 3 main bearing and walls	Norton grinder
Finish grind No. 1 main bearing and walls	10 x 36 in. Type "D" Landis plain grinder
Finish grind rear main bearing and walls	10 x 36 in. Type "D" Landis plain grinder
Finish grind front end	Norton grinder 23 x 36 in.
Finish grind all pin bearings and walls	Norton Universal pin grinders
Mill keyway in front end	No. 2 Kent-Owen hand mill
Drill, countersink, ream and tap front end	Natco horizontal drilling and tapping machine
Drill, chamfer, undercut and semi-ream pilot hole; drill, chamfer, ream and tap 6 holes in flange	
Station No. 1 Load and unload	
Station No. 2—Left hand Drill holes in front and half way Right hand Step drill pilot bearing hole and drill holes in flange in rear end	
Station No. 3—Left hand Drill hole to depth in front end Right hand Counterbore pilot bearing hole and countersink 6 drilled holes in rear end	
Station No. 4—Left hand Countersink hole in front end	
Station No. 4—Right hand	
Station No. 5—Left hand Ream tap hole in front end Right hand Semi-ream pilot bearing hole and ream 6 holes in rear end	
Station No. 6—Left hand Tap hole in front end Right hand	

each operation, will be found in another section of this article.

In addition to this type of material, we have reproduced two tables giving a complete list of producers of crankshaft forgings and suppliers of completely machined crankshafts. These listings are taken from the current issue of the Chilton Automotive Buyer's Guide.

Despite the variations in crankshaft manufacture due to the influence of size and weight, and more particularly because of the influence of productivity, it is surprising to note the similarity of processes, similarity of equipment in operations of diverse character. Doubtless this relative unanimity of practice comes from the specialized nature of product, imposing practically uniform demands upon specialized equipment.

All-purpose Lees-Bradner heavy duty thread miller is employed in cutting several oil return threads and small thread on stub end on Caterpillar crankshafts.



(Across the two pages) View of battery of 11 center drive crankshaft lathes in Plymouth plant.

Routing

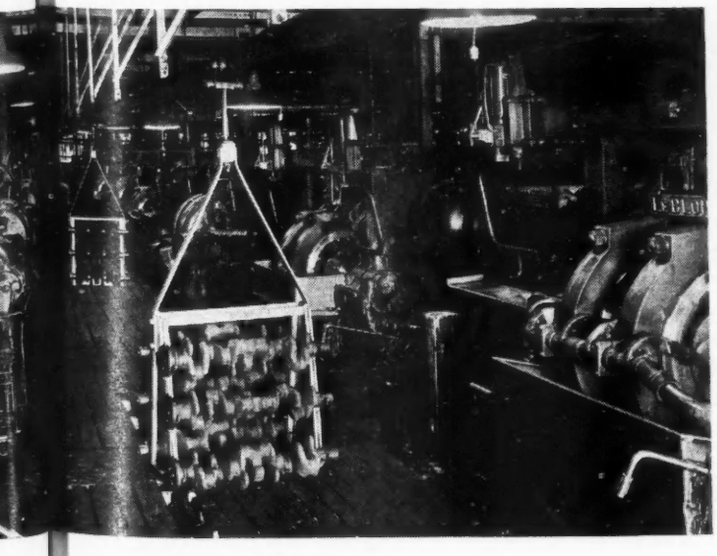
OPERATION	EQUIPMENT
Station No. 6—Right hand	
Chamfer oil holes and blow out	
Finish pilot bearing holes	LeBlond lathe
Finish turn oil thrower and cut oil return thread	20 in. American lathe
Burr pin bearing walls and cheek	
Remove burrs, stone oil holes and chamfer	
Straighten	
Static balance	GM dynamometer balance machine
Drill for balance	24 in. Barnes drill press
Check for balance, grind cheeks for balance, redrill for balance when necessary	GM dynamometer balance machine
Polish all main pin bearings	Schraner Model "B" hydraulic polish machine
Wash shaft	Thor balancer
Test oil lines	Wash tank
Blow out	Air hose and nozzle
Inspect for runout	
Recheck for balance when necessary	
Inspect and blow out oil lines	

The following section touches the high spots of machine shop operations.

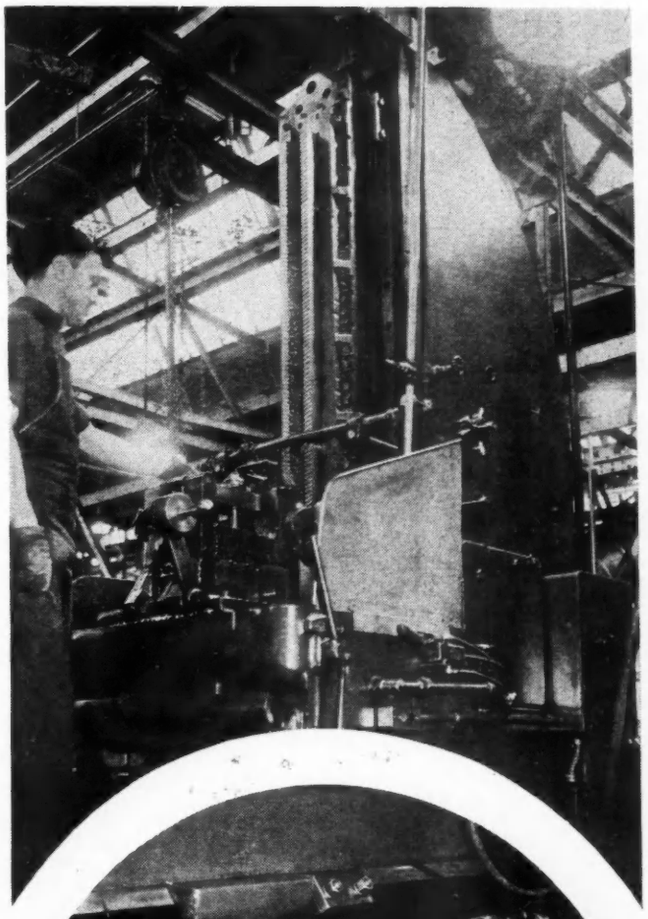
Analysis of Major Operations

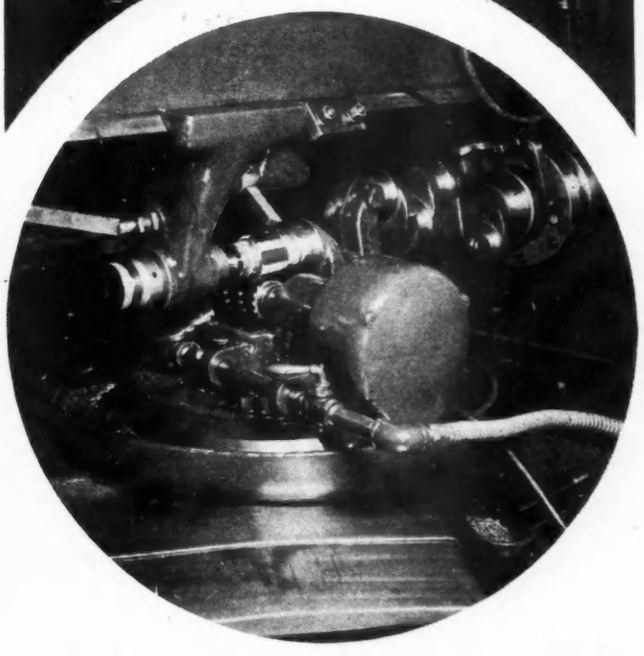
Turning—Examination of the machine shop lines of the industry as well as the routings reproduced here indicates unmistakably that equipment by LeBlond and Wickes dominates the picture so far as volume production is concerned. The only important exception we have noted recently is the set-up for machining a small four-cylinder engine crank at the Muskegon plant of Continental Motors where Fay automatics are employed for turning operations.

Latest developments in both makes of machines include duplex and center drive equipment. In the case of LeBlond, current advances have made possible cer-

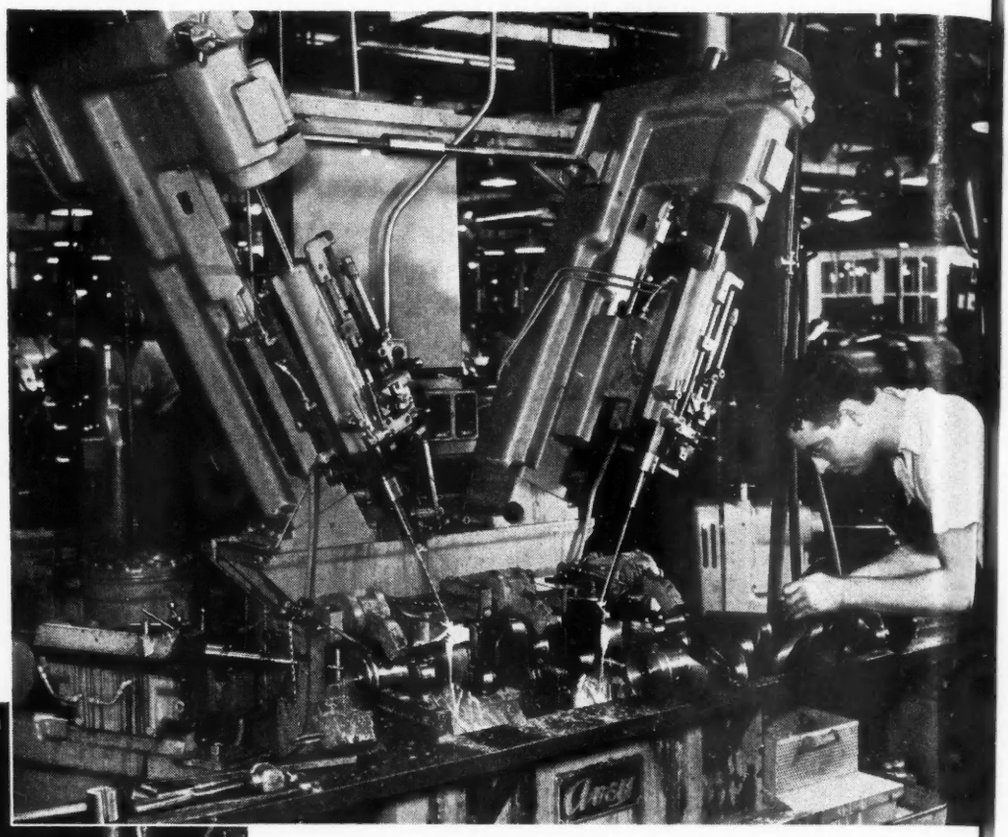


This towering surface broaching machine at Chrysler broaches the pin side of the center counterweight.



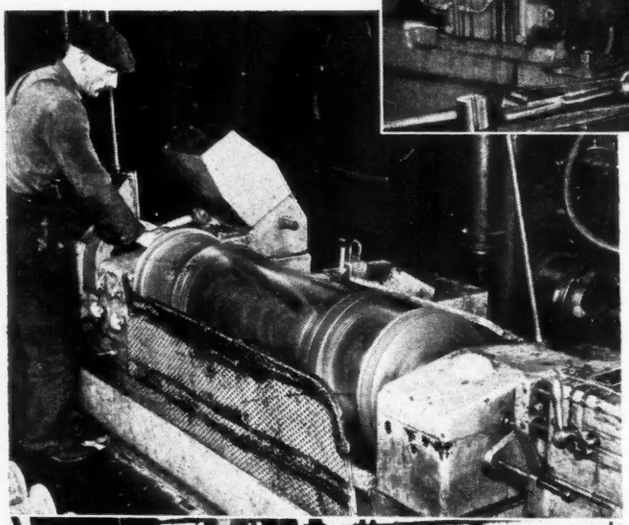


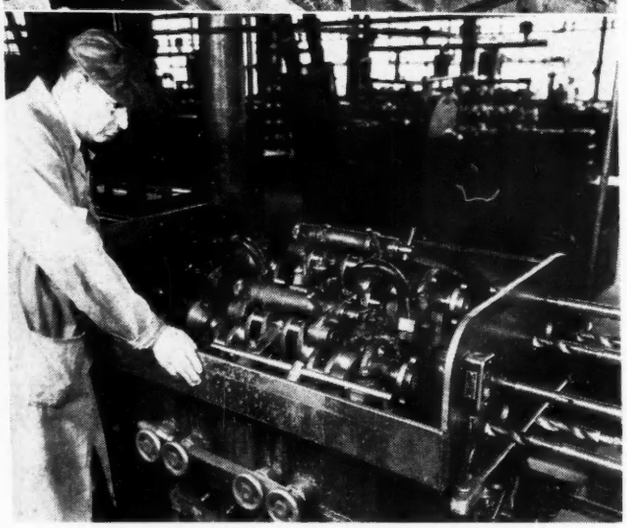
(Circle) Barber-Colman Type T taper spline hobbing machine set up for cutting the taper spline flywheel fit on Minneapolis-Moline RE crankshafts.



(Right) Close-up of part of battery of Avey oil hole drilling machines on Buick crankshaft line.

(Below) GMR mass centering machine in action, getting center of mass of rough crank forgings at Buick.





Barnes drill press for drilling pin holes in Nash crankshaft.

Minneapolis-Moline
Crankshaft Factory Routing

OPERATION	EQUIPMENT
Rough drill and center large end	Barnes 20 in. post drill
Turn center and end bearings	LeBlond 21 in. engine lathe
Turn large end	LeBlond 21 in. engine lathe
Rough turn and cheek 2 outer pins	Wickes pin lathe
Rough turn and cheek 2 inner pins	Wickes pin lathe
Grind end bearing	Landis 10 x 48 in. plain grinder
Rough and finish grind center bearing	Landis 10 x 48 in. plain grinder
Grind small end	Landis 10 x 48 in. plain grinder
Turn and cut 2 clearance grooves	LeBlond 17 in. engine lathe
Drill oil holes in webs	Leland - Gifford 2-spindle deep hole drill
Bore clutch shaft pilot hole	LeBlond 17 in. engine lathe
Cut off small end and recenter	Lodge & Shipley engine lathe
Taper spline for flywheel	Barber-Colman Type T hob
Mill flywheel nut threads	Lees Bradner thread mill
Cut 3 woodruff keyways	U. S. hand mill
Drill 2—¼ in. oil and 1 set screw hole	Barnes 20 in. post drill
Finish grind pins	Landis 16 x 42 in. crankshaft grinder
Balance	Tinius Olsen balancing machine
	Cincinnati post drill
Polish center bearing	Davis polishing lathe
Wash, remove burrs, and inspect	Bench

Buick Crankshaft Factory Routing

OPERATION	EQUIPMENT
Mass balance and center	GMC special mass balance and centering machine
Mill locating spots on Nos. 1-2-11-12 cheeks and mill driving spots on No. 7 cheek	No. 120 Producto-Matic milling machine
Rough turn and cheek main bearings and rough turn ends complete	LeBlond No. 7-ACL lathe
Straighten to check rough turn	Buick straightening machine
Finish turn and fillet main bearings and both ends complete	DM LeBlond lathe (4) station drum type indexing machine
Turn cheeks on pin bearings	LeBlond 6-ACL double spindle lathe
Turn all pins	LeBlond 5-ACL pin lathe
Straighten to check cheeker and pin lathe	Buick straightening machine
Drill (4) 3/16 and (1) 5/16 in. oil holes	Special Avey hydro-electric drill machine
Drill (4) 3/16 in. oil holes	Special Avey hydro-electric drill machine
Drill (4) 5/16 in. oil holes	Special Avey hydro-electric drilling machine
Drill (4) 5/16 in. oil holes	Special Avey hydro-electric drills
Grind oil hole drills	Hisey floor grinding machine
Blow out, burr, inspect and peen oil holes	Crankshaft peening machine
Straighten line bearings	Special Buick straightening machine
Finish grind thrust bearing	10 x 48 in. Landis type "D" plain grinder
Finish grind rear center bearings	10 x 48 in. Landis hydraulic grinder
Finish grind front center bearing	10 x 48 in. Landis grinder
Finish grind rear bearing	10 x 48 in. Landis grinder
Finish grind front bearing	10 x 48 in. Landis grinder
Finish grind No. 1 and No. 8 pin bearings	16 x 42 in. Landis hydraulic grinder
Finish grind No. 2 and No. 7 pin bearings	16 x 42 in. Landis grinder
Finish grind No. 3 and No. 6 pin bearings	16 x 42 in. Landis hydraulic grinder
Finish grind No. 4 and No. 5 pin bearings	16 x 42 in. Landis grinder
Straighten line bearings	Buick straightening machine
Grind flange face and outside diameter of pilot	10 x 36 in. Landis grinder
Drill 6 and ream 2 flange holes, drill, chamfer, rough and finish counterbore and undercut pilot hole, drill, chamfer, ream and tap hole in end of sprocket and pulley bearing	Natco two way horizontal combination hydraulic driller and lead screw tapper machine

OPERATION	EQUIPMENT
First Station. Load Second Station. Right hand head. Drill 7 holes Second Station. Right hand head. Drill 7 holes Second Station. Left hand head. Drill 1 hole Third Station. Right hand head. Rough counterbore and chamfer pilot hole Third Station. Left hand head. Chamfer hole Fourth Station. Right hand head. Finish counterbore (2) step pilot hole and ream (2) flange holes Fourth Station. Left hand head. Ream hole in sprocket bearing end Fifth Station. Right hand head. Undercut pilot hole Fifth Station. Left hand head. Tap hole in sprocket bearing end	
Finish bore and ream pilot hole	No. 5 Warner & Swasey turret lathe
Finish grind sprocket and puley bearings	10 x 48 in. Landis plain type "D" hydraulic grinders
Mill keyway in sprocket bearing burr 8 holes in pin bearings and file burr off keyway	No. 2 Producto heavy duty hand miller with special integral knee
Check and mark for balance	GMC balancing machine
Rough drill for balance Grind oil groove and blow off	21 in. Cincinnati drill press
Rough lap all pins and main bearings and oil groove	10 x 36 in. Landis grinder
Finish lap all pins, main bearing and oil groove	Model "B" Schraner Hydraulic crankshaft lapping machine
Burnish thrust bearing	Model "B" Schraner Hydraulic crankshaft lapping machine
Straighten line bearings and blow off	10 x 36 in. Landis grinder
Wipe throws	Buick straightening machine
Finish cheek for balance	Racks
Finish drill for balance	G.M. Balancing machine
Inspect fixture gage	21 in. Cincinnati drill press
Straighten when necessary	Bench
Wipe complete	Buick straightening machine
Inspect all lengths and diameters	Roller conveyor and carriers
Load on skids	Roller conveyor and carriers

tain types of machines which can accommodate up to five work stations instead of a single station, thus increasing the usefulness of the equipment for mass production.

Grinding—In general, it appears that crankshaft grinding lies in the province of two suppliers—Norton and Landis. In some cases, one or the other is used exclusively both for rough and finish grinding, in other cases both makes are employed—one for roughing, the other for finishing.

Oil Hole Drilling—Easily one of the most difficult drilling jobs in an automotive plant, crank oil hole drilling is particularly trying because of the hardness of the metal combined with relatively high length to bore ratio of the holes and the various degrees of angularity of oil leads. It is a job demanding intense specialization and in current practice the factory installations feature equipment produced by Avey and Leland-Gifford.

Spot Milling—In general, one of three types of millers—Cincinnati, Productomatic, and Sundstrand Rigidmill—is used for this application. Ruggedness, rigidity, and great accuracy are imperative because of the nature of the operation.

Flange Drilling—The past few years have marked the development of the huge drilling and tapping machines by Natco and Greenlee, loading three to six cranks at a time, drilling and tapping both ends in

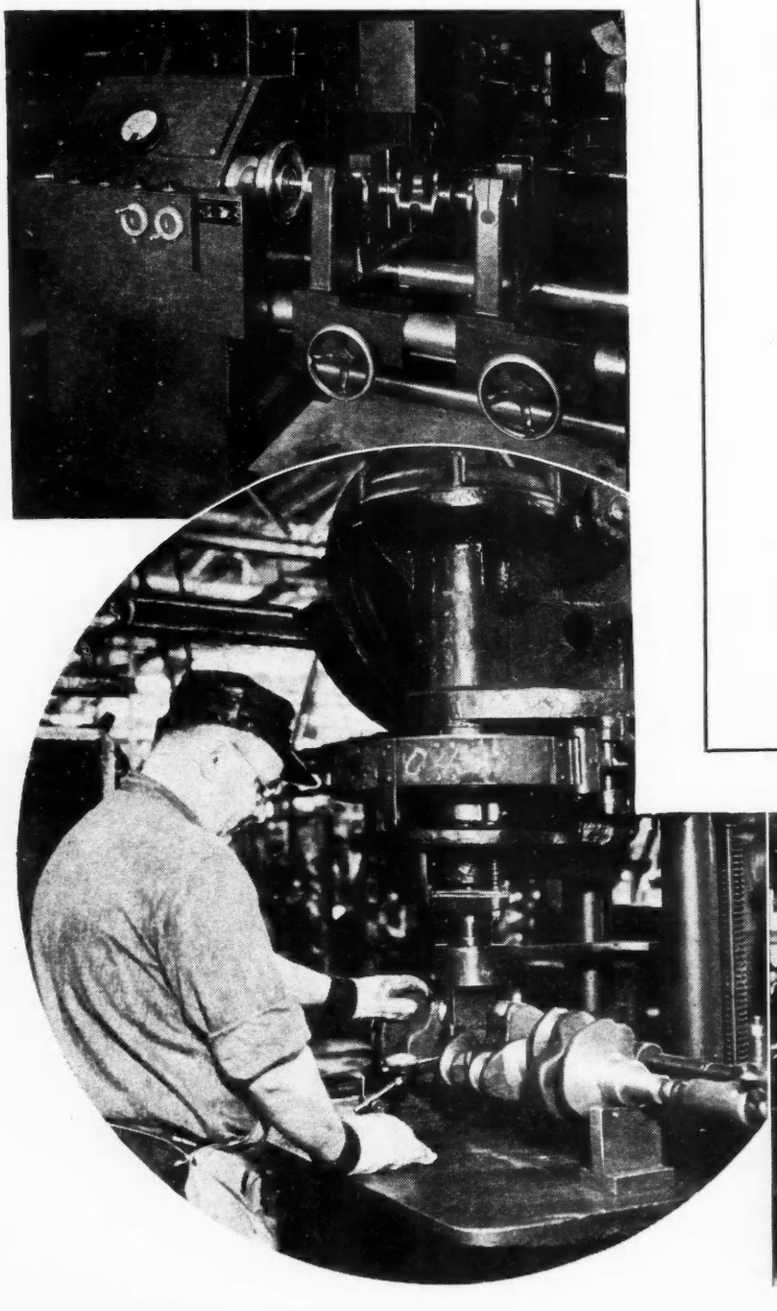
one setting. Current examples of such equipment will be found at Buick, on the Studebaker Champion line, and in other plants.

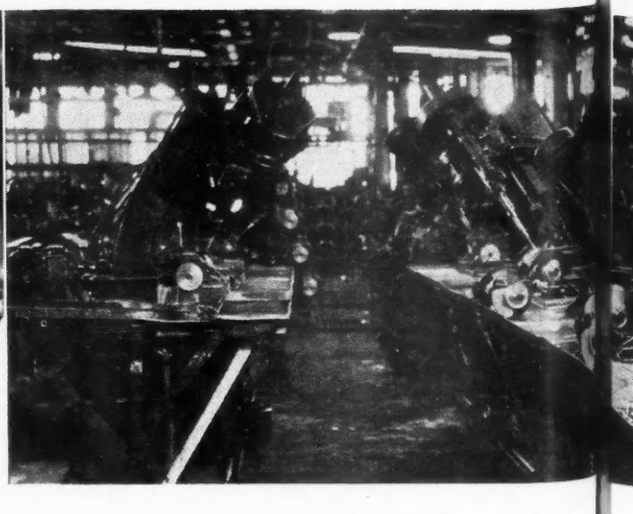
Pin and Bearing Finish—Up to a short time ago most crankshaft lines polished and lapped crank pins and bearings on the Schraner automatic polishing machine. However, the past 18 months or so have seen the entry of the Foster Superfinisher which has been widely adopted in Chrysler Corporation plants. In recent months, too, Schraner has brought out an improved polishing machine which is claimed to produce an unusually fine finish.

Balancing—Basic in the picture of quality control are the balancing operations. Needless to say, the higher engine speeds current today in all fields of engine operation and the demand for smoother operation, combine to make precise balance a criterion in every plant. Most popular makes of balancing equip-

IHC Crankshaft

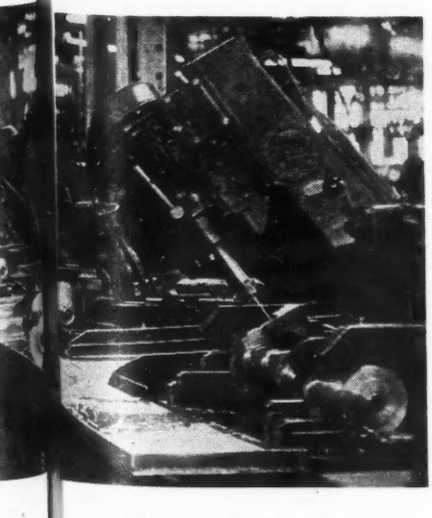
OPERATION	EQUIPMENT
Turn outside diameter or counterweights	4 x 26 in. Low-Swing lathe
Mill locating spots on No. 1 and No. 6 throws	Newton special crankshaft milling machine
Turn thread, pulley fit, gear fit, Nos. 1, 2, 3, 4 main bearings and flange diameters; rough form oil sling and flywheel bolt lock diameter, face cheeks at Nos. 1, 2, 3, and 4 main bearings	7 ACL LeBlond automatic crankshaft line bearing lathe
Check for straightness and straighten when necessary	20-ton No. 203 General flexible power press
Finish form oil sling and bolt lock diameters; face and chamfer thread, gear fit and No. 1 main bearing diameters chamfer outside diameters or flange	8 ACL LeBlond heavy duty automatic finish turning lathe
Mill excess stock between cheeks on Nos. 3 and 4 pins	2 Newton special one-way unit hand mill
Face cheeks and turn 6 pin bearings	6 AC LeBlond automatic double-spindle crankshaft pin lathe
Drill oil holes from No. 1 main bearing to No. 1 pin bearing and from No. 4 main bearing to No. 6 pin bearing	Leland-Gifford 2-spindle automatic drill press
Drill oil holes from No. 2 main bearings to No. 2 pin bearing and from No. 3 main bearing to No. 5 pin bearing	Leland-Gifford 2-spindle automatic drill press
Drill oil holes from No. 2 main bearings to No. 3 pin bearing and from No. 3 main bearing to No. 4 pin bearing	Leland-Gifford 2-spindle automatic drill press
File burrs from outside diameter of cheeks and from locating spots	Bench
Straighten	No. 203 20-ton General flexible press
Grind side walls and outside diameter of No. 2 and No. 3 main bearings	10x36 in. Landis Type "D" hydraulic grinder
Grind side wall and outside diameter of No. 1 main ing	10x36 in. Landis type "D" hydraulic grinder





Factory Routing

OPERATION	EQUIPMENT
Grind face of No. 1 main bearing for thrust and grind outside diameter of gear fit diameter	10x36 in. Landis type "C" hydraulic grinder
Grind side walls and outside diameter of No. 4 main bearing	10x36 in. Landis type "D" hydraulic grinder
Grind outside diameter of flange	10x36 in. Landis type "C" hydraulic grinder
Grind pulley fit and thread diameters	10x36 in. Landis type "C" hydraulic grinder
Grind side walls and outside diameter of 6 pin bearings	16x42 in. Landis type "D" hydraulic grinder
Cut oil thread and file burrs	16 in. Springfield engine lathe
Drill grease pocket hole in flange end	Colburn No. 2 2-spindle drill press
Counterbore flange for clearance	No. 242 Barnes single spindle drill press
Straighten	20-ton General flexible press
Finish face flywheel contact face of flange, chamfer outside diameter of flange and recenter flange end	18 in. x 8 ft. LeBlond engine lathe
Drill 4 flywheel bolt and 2 dowel holes in flange	32 in. Cincinnati Bickford drill press
Mill Woodruff keyways in pulley fit and gear fit diameters and burr 6 flange holes and 2 keyways	Kent-Owens hand mill
Balance (dynamic)	No. 3-S Olsen balancing machine
Drill holes for balance	Barnes single-spindle drill press
Balance (static)	Micro-poise balancer
Snag grind for balance, when necessary	No. 74 Safety 2 - wheel snag grinder
Burr complete and break corners at ends of 6 oil holes	16 in. Von Wyck engine lathe
Mill starting nut thread	Lees - Bradner standard thread mill
Finish straighten	8-ton general flexible press
Wash and brush chips from oil holes and lap 4 main bearings and 6 pin bearings	Schraner hydraulic lapping machine
Wash	Blakeslee washing machine
Inspect	



(Upper left) Newly developed Gisholt Dynetric crankshaft balancing machine is in operation in one of the prominent large production motor car plants.

(Circle) View of 20-ton flexible press used for straightening Chrysler crankshaft line

(Bottom) View of battery of Leland-Gifford crankshaft oil hole drilling machines fitted with the hydraulic step-by-step feed mechanism.

ment in current use include—Tinius Olsen, Gisholt, General Motors, Globe. Gisholt has just brought out a new balancing machine called the Type C Dynetric balancer which is arranged to provide correction readings at four points. It is claimed that an average operator can take the correction readings and mark the work in only 24 seconds with a floor-to-floor time of less than one minute. Unique feature is calibration of the machine to give readings for correction directly in practical units.

Materials Handling—As in other operations, materials handling plays an important role in crankshaft production, particularly because of the bulk and weight of the product. In most large production plants it is common practice to circle the entire crank machine line with an endless overhead monorail, using an extra heavy duty system. Usually the cranks are loaded in large cradles which can accommodate from four to six cranks at a time. For the larger cranks it is necessary to provide manually or power-operated hoists for handling work in and out of the machine.

Forging Practice

A good example of modern forging practice is found in the Buick forge shop in Flint, given below:

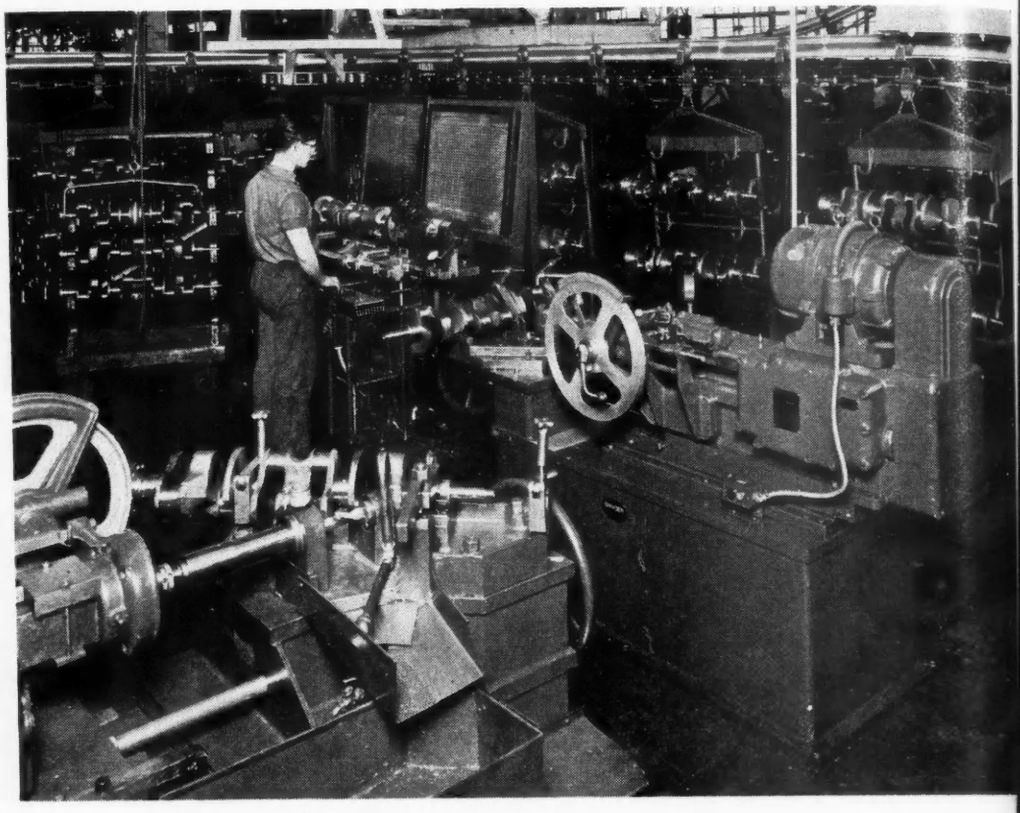
OPERATION	EQUIPMENT
Cut steel	No. 15 Buffalo shear
Heat	Continuous furnace
Forge	16,000 lb. steam hammer
Hot trim	No. 59¼ Toledo press
Upset flange	5 inch Ajax upsetter
Twist	Ajax twister
Inspect bench	
Heat treat	High heat furnace
Set	600-ton Chambersburg hydraulic press
Quench	Buick quench machine
Draw	Draw furnace
Hot straighten	Metalwood hydraulic press
Pickle	Mesta pickling machine and 3 tanks
Brinell Test 100 per cent	Gogan hydraulic test machine
Inspect	Bench

Reference to the Buick routing will indicate that the first operation following forge inspection is that of mass balancing. This produces the locating centers for the subsequent turning and grinding operations.

An interesting commentary on modern drop forging practice is found in the operation of the leading suppliers in this field. The Atlas Drop Forge Co., Lansing, Mich., one of the fine names in this industry has a slogan—"A good forging must be more than a shape"—which really is the gist of what lies behind modern forging practice. A visit to this plant will reveal the background of the hidden values in the product.

First and foremost is an experienced engineering service offered in cooperation with the engine builder's design department. This takes into account the initial design with respect to drop forging procedures, die design, as well as a consideration of the final machine shop operations.

Basic to good forging practice is the metallurgy of the raw material, specifications—chemical and physical, grain size, etc. This is achieved through the maintenance of a metallurgical department and laboratory, close contact and control of both the steel mill and the handling of materials in the forge shop. An interesting commentary on this feature of the service is the fact that Atlas is called upon as a specialist in the development of forging steels by various universities.



Unique set up in International Harvester engine plant for balancing crankshafts comprises Olsen balancing machines served by special balance drilling equipment seen in the foreground. Each of the two machines has a bed and calibrating fixture with drilling attachment consisting of a horizontal, hydraulic unit made by W. F. & John Barnes. The machines were built by Snyder of Detroit.

Allis-Chalmers

Crankshaft Factory Routing

Model "WC" engine

OPERATION	EQUIPMENT
Mill locating pads	No. 3 Sundstrand Rigidmill
Rough turn main bearings and flange	No. 7 LeBlond crankshaft lathe
Finish turn main bearings and flange	No. 7 LeBlond crankshaft lathe
Rough turn and finish turn pin bearings	No. 6 LeBlond 2-station lathe
Mill oil groove on both ends	Smalley thread miller
Straighten center main to 0.003 in.	Hand straightening press
Drill oil, wick and fan pulley pin holes	Avey 6-spindle special drill press
Chamfer oil hole in thrust bearings	Special bench fixture
Grind, center and rear main bearings and flange	10 in. x 36 in. plain Landis grinder
Grind thrust bearing, and crankshaft gear diameter	10 x 36 in. plain Landis grinder
Grind 4 connecting rod pins	16 x 42 in. Landis crank grinders (2)
Drill, tap and chamfer flange holes	Rockford special drill and tap machine
Mill keyway and ream taper hole	No. 1 U. S. Key Miller with special attachment for reamed hole
Dynamic balance	Globe balance machine
Polish 7 bearing surfaces and clean oil holes	Schraner hone
File burrs and chamfer oil holes	Bench
Clean	Dip tank—cleaning fluid

There are two currently outstanding methods of forging crankshafts, both of which are employed by Atlas—one for short runs, the other for large production quantities. For short runs there is the unique technique of forging cranks in a single forging machine fitted with multiple dies embodying the principle of positioned cranks. Skilled, patented die design permits the production of cranks rapidly and with great precision.

For large volume, the crank is processed over a number of forges, over a number of different dies, including also the operations of trimming, upsetting, and twisting. It is claimed that this company was the first to use the automatic twisting machines which produces the final form to precise dimensional limits.

Final operations include heat treatment under automatically controlled conditions, followed by metal cleaning which depends upon the customer's requirements. Many of the shafts are cleaned by shot blasting, resulting in velvety silver-like appearance. Quality control is a 100 per cent operation, starting with a double check for Brinell hardness, followed by measurements for machining stock surplus, indexing, spacing of bearings and pins, and the test for balance.

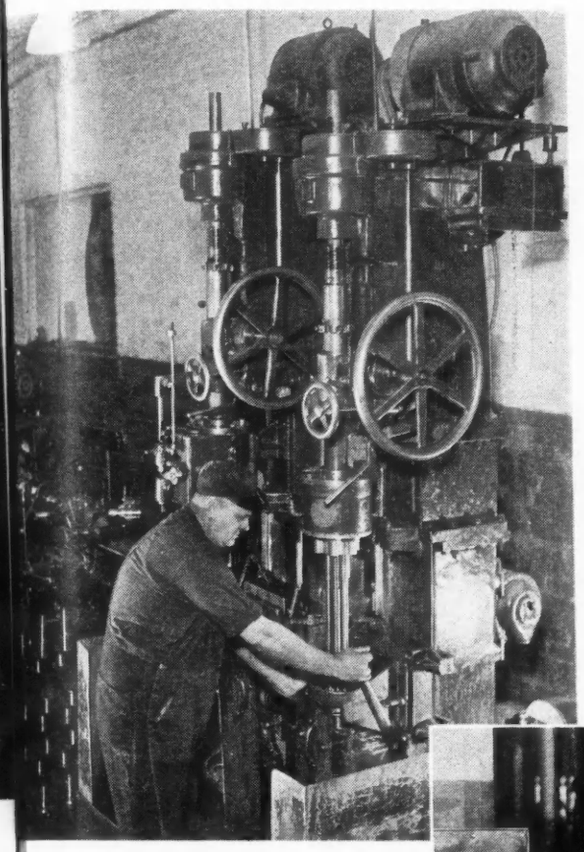
Atlas uses machines of their own design and manufacture for producing crankshaft forgings, centered to balance wherever specified by the customer, thus reducing balancing costs on the machine line.

Wyman-Gordon, one of the finest names in drop forgings, specializes in crankshafts exclusively. Headquarters plant in Worcester, Mass., produces cranks for aircraft engines; other plants are located in Harvey, Ill., and Detroit. The Harvey plant produces cranks for the general run of truck, tractor, Diesel, and industrial engines.

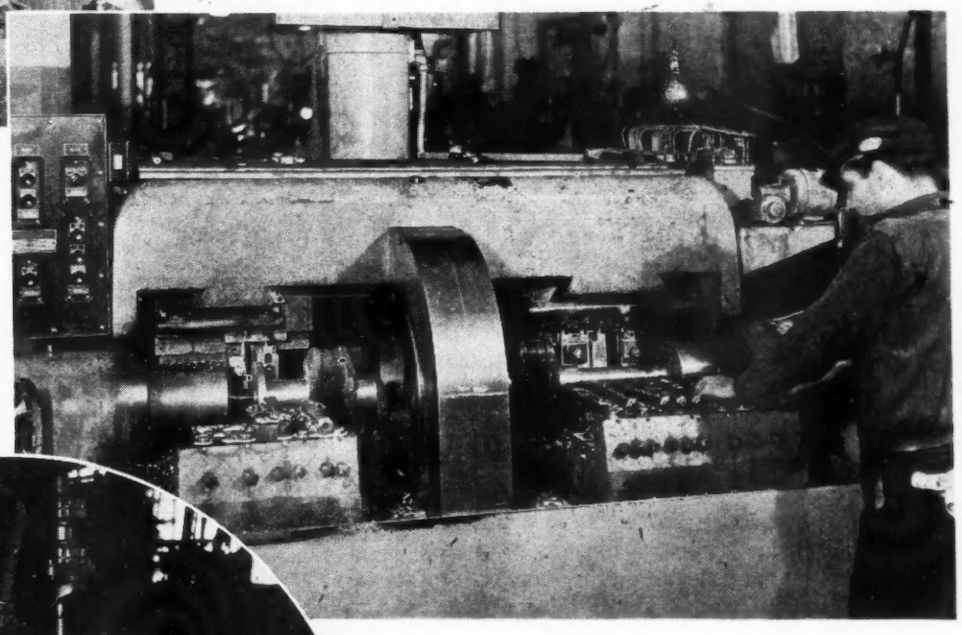
This organization offers a specialized engineering service to its customers, and is a pioneer in the development of good forging practice through intensive laboratory and service research in forging steels, metallurgy, die design, and forging techniques.

While on the subject of forging practice it is worthy of note that modern practice makes it possible to effect a reduction in the overall fabrication costs of the crank through proper consideration of initial design elements. Correct distribution of metal and the proper consideration of initial design elements. Correct distribution of metal and the proper control of forging operations may be combined to effect better rough balance with a consequent reduction in final balancing operations. Improvement in die design and the ability to produce very complicated forms with minimum draft—three degrees currently—go far to reduce excess weight, to cut the scrap pile and the investment it represents.

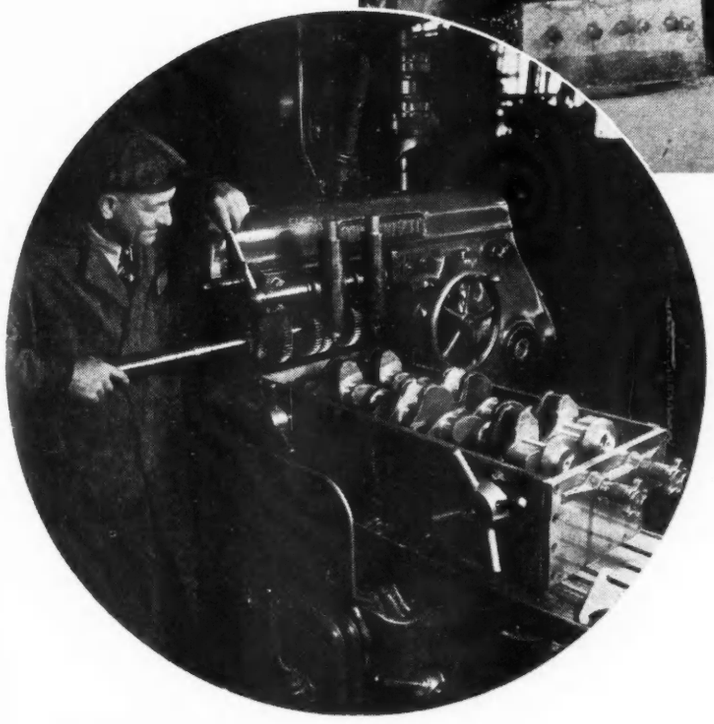
THE OHIO CRANKSHAFT CO.—This is one of the prominent suppliers of finish-machined crankshafts used by many important commercial engine builders.



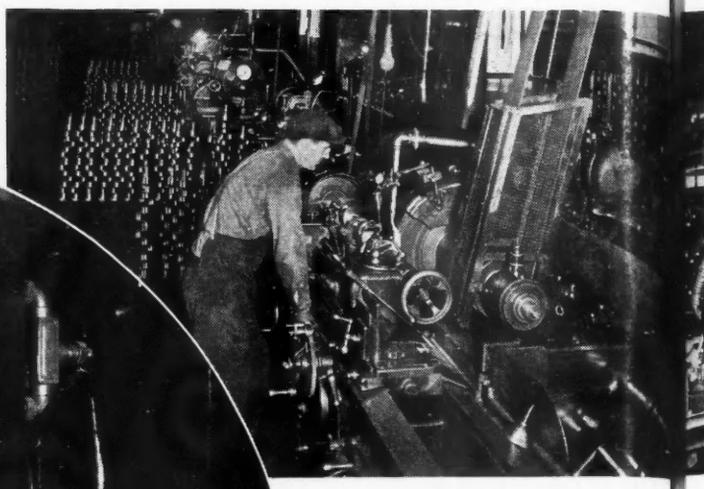
(Above) Baker drill press at Waukesha set up for drilling, chamfering, and tapping six flange holes in crankshaft. Note that the shafts are held in a vertical fixture.

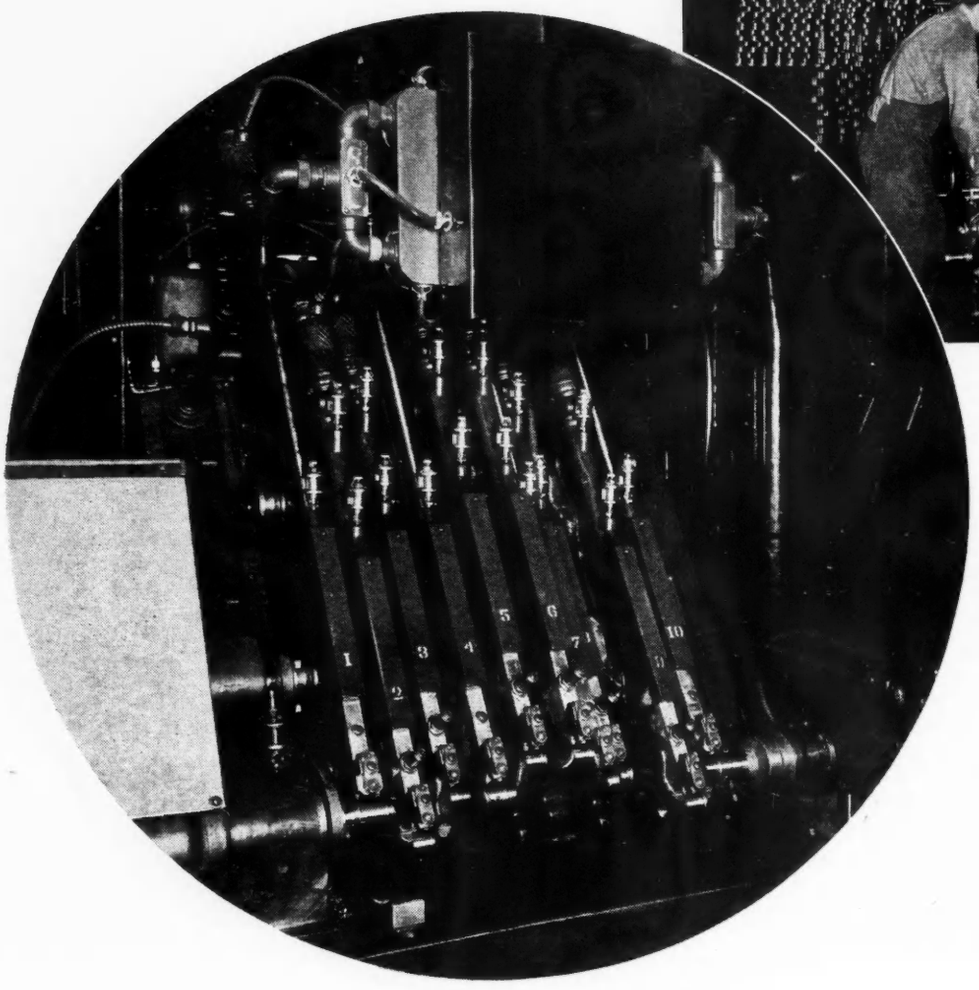


Wickes Bros. center drive crankshaft lathe is part of a large battery of Wickes machines in Caterpillar plant.



(Circle) Cincinnati milling machine for milling locating spots on Nash crankshafts.





(Above) Close-up of one of a battery of Norton crankshaft grinders at Waukesha.

(At left on facing page) Main bearing operations on the Packard crankshafts, including first production application of surface broaching in the same machine, are accomplished on this massive Wickes semi-automatic crankshaft lathe.

(At right on facing page) This special Rockford machine is in use at Allis-Chalmers for the drilling and reaming of the flywheel flange holes.

(Circle) Crankshaft Superfinisher used at Plymouth, finishing the four mains and six rod bearings.

including producers of Diesel engines. In its new plant in Cleveland, the company machines and hardens a wide variety of shafts from the smallest automotive size to the large Diesel shafts weighing up to two tons.

Greatest interest in the work of this organization arises from its development of the Tocco process of induction-hardening of pins and bearings. Equipment for this purpose is used in their own plant and is sold to the larger producers of crankshafts such as Packard. Two types of equipment are employed for this purpose, depending upon the size of the work and the volume in which it is produced.

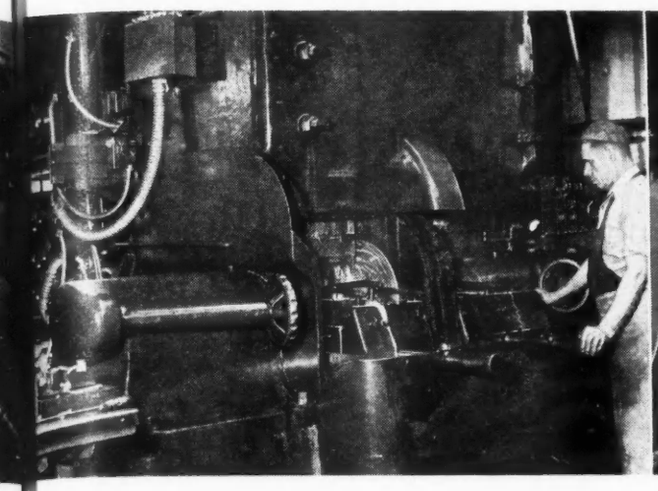
The first of these is the so-called "Tunnel Line" used for very large crankshafts with comparatively low production requirements. In this equipment the shaft is set on dollies for moving from one hardening station to the next so that the shaft is moved for every bearing hardened. On the "vertical" type of equipment, which is used for the smaller cranks, the shaft is laid into position in the machine and three or four bearings hardened at one setting but not simultaneously. In this way the shaft is moved only three or four times to harden a seven bearing, six throw shaft. This type of equipment, of course, permits higher production per man and lowers the hardening cost.

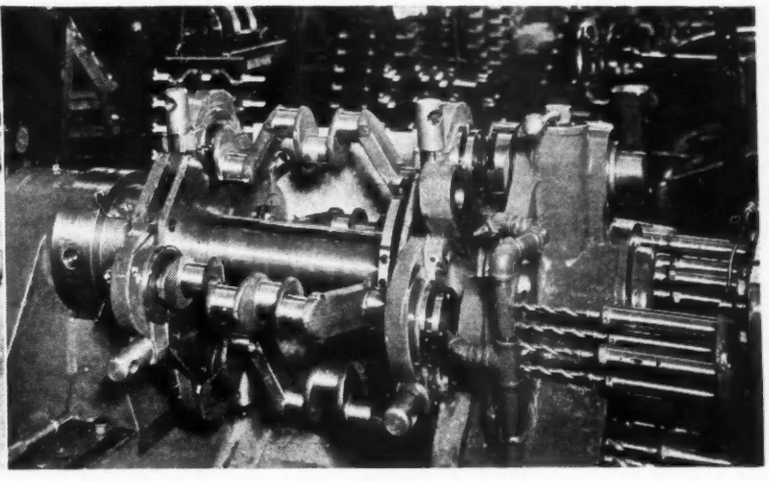
After hardening, the shafts are oil-drawn to 450 deg Fahr., and this is followed by Magnaflux inspection for the detection of possible flaws. Tocco hardening has been successful in heavy duty service, particularly for use with copper-lead bearings where the journal has to have an extremely hard surface.

Mass Centering

It is obvious that no matter how accurately a crankshaft is forged nor how evenly the metal is distributed, it can be machined out of balance if the centers are not located in proper relation to the center of mass of the rough forging. Buick was the first of the engine builders to place in production use the then newly developed GMR mass balancing and centering machine. On the basis of production experience, Buick estimates that this method has reduced the total time of balancing the crank about 70 per cent when compared with the old method of rolling for balance in use some years ago.

The centering machine consists essentially of an





Waukesha Crankshaft Factory Routing

OPERATION	EQUIPMENT
Mill 2 locating spots and fill burr, rough turn cheek center main bearings	Kempsmith mill LeBlond lathe
Straighten for center drive within 0.006 in. and truck to and from machine	Lourie press
Rough grind center main bearing fillets, rough turn gear end and flange end complete	Landis grinder LeBlond lathe
Rough turn cheek all rod journals and cheeks	LeBlond lathe
Straighten for grinding within 0.003 in.	Lourie press
Rough & finish grind line bearings and fillets	Landis grinder
Finish grind gear & pulley fit and clutch dimensions break corners	Landis grinder
Finish grind flange outside diameter and break corner	Norton grinder
Rough grind 4 rod journals and fillets	Landis grinder
Finish grind 4 rod journals and fillets	Landis grinder
Drill oil line 1 and 2 main bearing to rod journals	Avey drill press
Drill oil lines 3 and 4 main bearing to rod journals	Avey drill press
Chamfer oil holes by hand and mill 2 oil slots and file burrs	Standard hand miller
Straighten to within 0.002 in. run-out	Lourie hydraulic press
Face flange and turn deflector, face back of flange and counterbore flange, chamfer flange one side and break corner other side with file	LeBlond lathe
Grind deflector groove and wall	Norton grinder
Drill, chamfer and tap 6 flange holes	Baker drill press
Mill keyway gear end (flat)	Standard hand miller
Mill woodruff keyway gear end	Kempsmith miller
Face gear end to length, undercut, turn and thread crank jaw diameter	Foster turret lathe
Drill wick hole, file hole to remove burrs	Avey drill press
Counterdrill flange and break corners	Barnes Drill Company drill press
Drill and ream pin hole and lock screw hole and hand ream pin hole and tap lock screw hole and file burrs and drill oil hole	Avey single spindle drill press
Gisholt check for balance on gear and flange end and drill for balance complete	Avey single spindle drill press Gisholt balancer
Finish straighten to within 0.02 in. run-out	Flexible hydraulic power press
Finish face flange and break corners	Foster turret lathe
File burrs and scrape corners on oil slots. Chamfer oil line holes, polish shaft and chamfer groove, break corner with file and airblast	Speed lathe
Inspect	

electric balancer and center drilling equipment. The rough forging is placed in the horizontal cradle, the shaft being held on each end by four plungers 90 degrees apart, one of each pair of opposed plungers being floated under spring pressure while the opposite plungers are minutely adjustable by means of small electric motors built into the cradle with a high ratio of gear reduction to the plunger shaft. As the shaft begins to rotate, the amount of out-of-balance is registered on a continuous light beam indicator mounted on the back of the machine. There are two light beams on the dial, one for each end of the shaft and the dial is divided into eight zones corresponding to the four quadrants and locating plungers on each end of the shaft. At the end of the machine there is a control board for actuating the adjusting motors, each motor being represented by two buttons, one to advance and one to reverse the plunger. When an error in balance has been indicated and isolated in a particular zone, the shaft is adjusted until the light beam runs between two vertical and parallel lines on the dial, these lines being spaced at a maximum of two ounce-inches apart. When this balanced condition has been reached, the

(*Turn to page* 123, *please*)

Wha' d'ye Mean

By MARTIN E. GOLDMAN*

IF THE people who have a part in O.K.'ing advertising schedules realized the enormous annual waste that results from a confused terminology, there would unquestionably be a vociferous demand for clarified definitions of some very generally used and harmless sounding nomenclature.

It is my purpose to simplify greatly a subject that has become completely confused. Everyone concerned with advertising is prone to divide advertising media into three general classifications—national media, local media and trade papers. It is those three "general" designations that I should like to talk about because, as used today, those three phrases are the daddies of a lot of economic waste.

A moment's reflection will serve to prove the first classification a complete misnomer. "National" is merely a convenient term for grouping 48 states. To have a "national" circulation does not imply the covering of the nation's population. There are so-called national publications with a circulation of only 3000 . . . others with circulations of upwards of 3,000,000.

What is usually meant when the term "national media" is used is "*consumer* publications" or consumer media with some circulation throughout the nation. All advertising, to be effective, must sell individuals and the fact that a publication has consumer circulation in many or all parts of the country on the same day in no way changes its "local effectiveness."

When an advertisement convinces Mr. and Mrs. Baltimore, Md., or Mr. and Mrs. Seattle, Wash., or Mr. and Mrs. Phoenix, Ariz., that a certain product is a good thing for them to purchase, then Mr. and Mrs. Baltimore, Md., or Mr. and Mrs. Seattle, Wash., or Mr. and Mrs. Phoenix, Ariz., go to a local merchant and make a local purchase with local money. If all three of them, together with people in many other cities, make identical purchases at the same time, the multiplication of purchases in no way alters the fact that each transaction was a strictly local affair. To go back a step, each copy of the so-called "national magazine" made a local visit to a local home to make the local sale.

What is meant by "national" media is, in reality, "consumer" media. They are media which talk to the actual consumer-user of a commodity or service in many markets simultaneously.

The local circulation of so-called "national magazines" is no more "national" than is an individual billboard placed in a local community, which board is identical with other boards simultaneously placed in other communities in other parts of the country. By the same token, an advertisement in a "local" newspaper is no more "localized" than the same advertisement read by the same person in his copy of a so-called national magazine.

The primary purpose of so-called "national" media is to take a sales message to selected local groups in various parts of the country. Their fundamental difference from local media is that national media cover groups of individual markets simultaneously, whereas "local media" cover an individual market. If national media were considered on the basis of reaching groups of markets, and so-called local market media were considered on the basis of reaching an individual market, there would be much less confusion.

IF you have even a little finger in your company's advertising plans or policies you will be interested in Mr. Goldman's vigorous discussion of some of the misnomers which are used in planning the average advertising campaign

I think that all this confusion in media terminology started with what, at the time, seemed to be a very minor incident. I think the trouble started when the first fellow asked the question, "Is it a trade paper account or a national account?" That fellow drove a wedge which first separated all magazines into two groups and which later resulted in the national-local-trade media mixup.

If the man of whom the question was originally asked had told the questioner that the question didn't make sense, he would have undoubtedly avoided much confusion. But as is so often the case, an attempt was made to *answer* the foolish question.

The question is about like holding up a piece of

*The Aitkin-Kynett Co., Philadelphia, advertising executive

"National" Advertising?

All advertising, to be effective, must sell to individuals. Locating and hitting the right ones is the job of any medium: general publication or business paper

fruit and saying, "Is this a Jonathan or an apple?" In the first place, most so-called, trade papers are "*national*." In the second place, "trade papers" is a very generally misunderstood term.

As a matter of fact, many surveys have indicated that what the advertiser calls a "trade paper" is regarded as a magazine by the readers of the publication. These surveys further indicate that what manufacturers call "house organs," the trade often calls "trade papers."

In the third place, a lot of so-called "trade papers" are, in reality, consumer publications because in many instances the readers of the so-called "trade" publications are the actual consumer-users of a lot of the products and services advertised.

Actually what the man who asked the original question, "Is it a trade paper account or a national account?" wanted to know was, "Is the account going to spend a little money or a lot of money?" But regardless of where or how it was started, the fact remains that there is a lot of badly confused thinking as a result of this national-local-trade terminology.

If a manufacturer has a message about his product that he wants to tell to consumers, then his first decision is, "Who are the people to whom the story should be told?"

Perhaps the product is one which appeals only to children and little adult influence is necessary. Or it may be for men only. Or it may be an item of strictly woman interest. Or it may be a product of general mass sales opportunity. Or it may be a thin market item saleable to restricted members. But a determination of the type of people who represent the most likely buyers is the first step toward media selection, just as it is the first step toward the development of the sales approach, the copy theme, distribution, etc.

A manufacturer has certain messages to tell to certain groups of people. He has one message for the consumer-user of the product. He has the same message with probably some additional things to say to retailers of the product. Then there are still other things to say to the wholesalers or distributors. There may be other groups of importance such as the wholesaler's salesmen, etc.

Now once the type people to be reached is decided, then the next step is *how* to reach them most economically and effectively.

It is not my purpose to make this a treatise on space buying. Space buying or media selection is a very highly specialized and intricate job, and involves the consideration and balancing of many factors.

It is my purpose merely to attempt a clarification of the confusion in general media classification. Once a manufacturer decides upon the types of people to whom his story should be told, it then becomes a question of the localities in which groups of people are to be addressed. The fundamental involved in this decision is simply, "Does the manufacturer want to tell his story to a lot of people in a few places, or to a few people in a lot of places?"

This decision made, it is the job of the space buyer to recommend the best media for the specific job of reaching the specified groups. But it is not a matter of whether the medium is a national medium, or a trade medium, or a local medium, because it is obvious that direct mail, newspapers, billboards, radio and many other media can be used locally, sectionally or nationally.

It is true that certain magazines and other so-called national media simultaneously covering groups of individual markets cannot separately sell their circulation in individual markets, but this does not, in any way, alter the local effectiveness of their local circulation.

Now let's take this question of trade papers. The so-called trade paper is a magazine edited specifically to interest a group of people with common interest in a known subject. You can buy some trade papers with local circulation. You can buy some trade papers with sectional circulation. You can buy some trade papers with national circulation. The geographical circulation has nothing to do with the classification of the media from an audience standpoint, and if the papers were purchased on the basis of audience, we believe that they would be given much more intelligent consideration and used much more productively.

People write letters to people, and they not alone are careful that the content of the letter is written with an appeal to the person addressed, but, if wise, they are careful in the selection of the mailing list to assure the coverage of the particular group for whom the letter has an appeal. The same principle applies to

(*Continued on page* 142)

Design

ENGINE BEARINGS were discussed in a paper read at the World Automotive Engineering Congress by Albert B. Willi, chief engineer, Federal-Mogul Corporation, Detroit. Mr. Willi presented a table or chart intended to show the fields of usefulness of five different bearing alloys, which is reproduced herewith. It should be pointed out in this connection that in the expressions Zn/P and PV, P represents the maximum and not the mean unit pressure on the projected bearing surface. Mr. Willi stated that it is no guarantee of a successful installation if the load factors are within the limits given in the table, though with such loadings a successful installation is possible.

The oil-reservoir temperatures given in the chart, which are based on successful practice, allow for a temperature rise of between 25 and 50 deg. at the bearing surface. Physical properties of a group of white-metal bearing alloys at temperatures up to 300 deg. Fahr. are shown in Fig. 1. From these graphs it will be seen that S.A.E. No. 11 babbitt (*F*) drops in tensile strength from 10,500 lb. per sq. in. at 70 deg. Fahr. to 4000 lb. per sq. in. at 300 deg., while in hardness it drops from 24.5 to 8 Brinell over the same

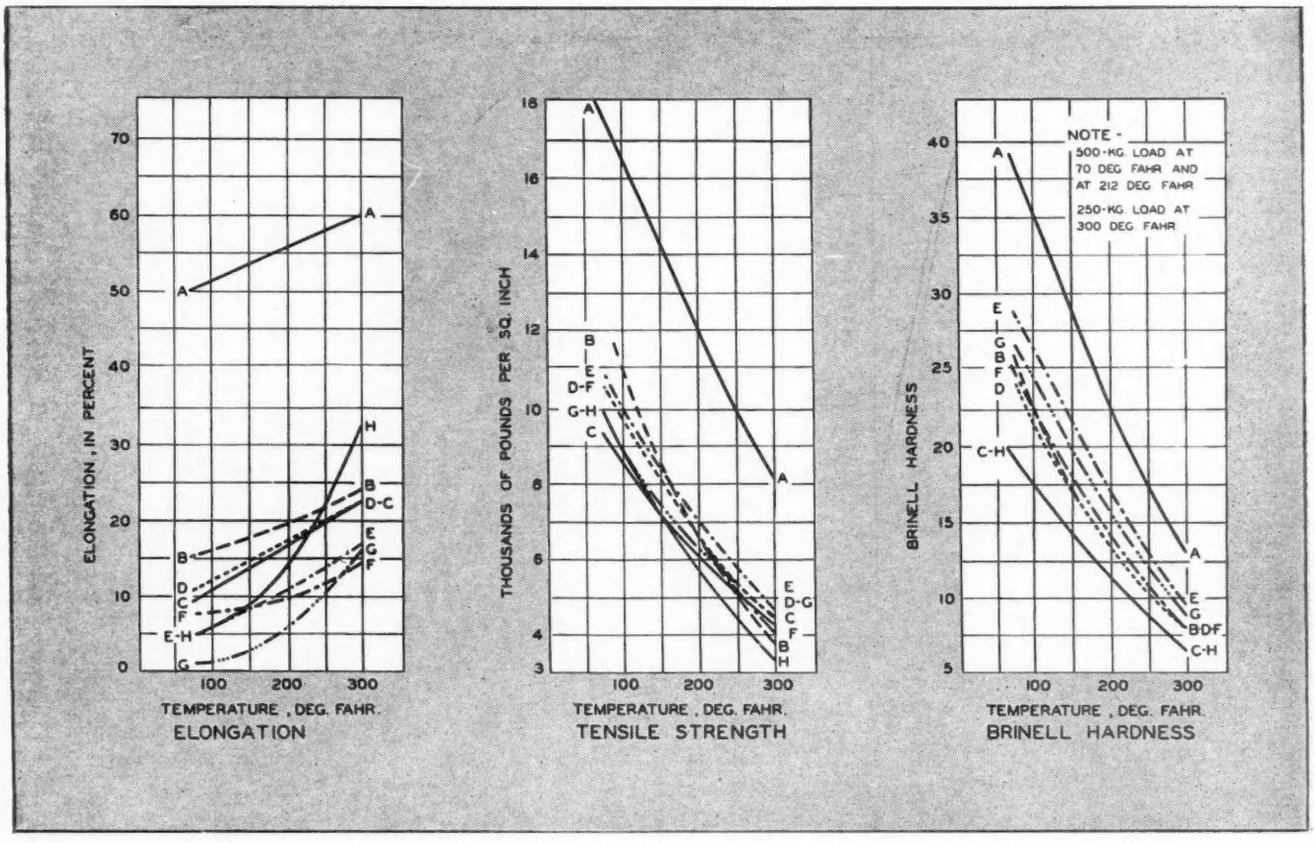


Fig. 1—Physical properties of alloys used for bearing linings

A, Cadmium-silver containing 0.75 per cent silver, 0.50 per cent copper, balance cadmium; solidification point, 598 deg. Fahr.

B, tin-base babbitt containing 89 per cent tin, 2 per cent copper and 9 per cent antimony. Complete solidification temperature, 465 deg. Fahr.

C, tin-base babbitt containing 91 per cent tin, 4.5 per cent copper. Complete solidification temperature, 433 deg. Fahr.

D, tin-base babbitt (genuine), containing 89 per cent tin, 3.5 per cent copper and 7.5 per cent antimony. Complete solidification temperature, 465 deg. Fahr.

E, tin-base babbitt containing 85 per cent tin, 7.5 per cent copper and 7.5 per cent antimony. Complete solidification temperature, 465 deg. Fahr.

F, tin-base babbitt (S.A.E. No. 11), containing 87.5 per cent tin, 5.75 per cent copper and 6.75 per cent antimony. Complete solidification temperature, 465 deg. F.

G, Lead-base babbitt containing 65 per cent lead, 17.5 per cent antimony and 17.5 per cent tin.

H, Berma high-lead babbitt containing 84.5 per cent lead, 9.5 per cent antimony and 6 per cent tin. Complete solidification temperature, 462 deg. Fahr.

# of Engine Bearings

temperature range. Bearings operating at temperatures at which the lining metal is not far from the plastic state cannot well be expected to show the normal life.

When the very thin steel-back bearings were first introduced, it was found that (as shown in Fig. 2) areas of failure developed adjacent to the parting faces, rather than where the bearing is most highly loaded. These same bearings, it was observed, usually lost their "spread" after a comparatively short period of operation. By "spread" is meant the greater width across the open end, as compared with the rod or crankcase bore. At assembly, such a bearing is snapped or forced lightly to its seat. When disassembled after a dynamometer test or after normal road operations, these bearings were found to be loose in their seats and would readily drop out, some showing a loss of "spread" of as much as 0.050 to 0.060 in.

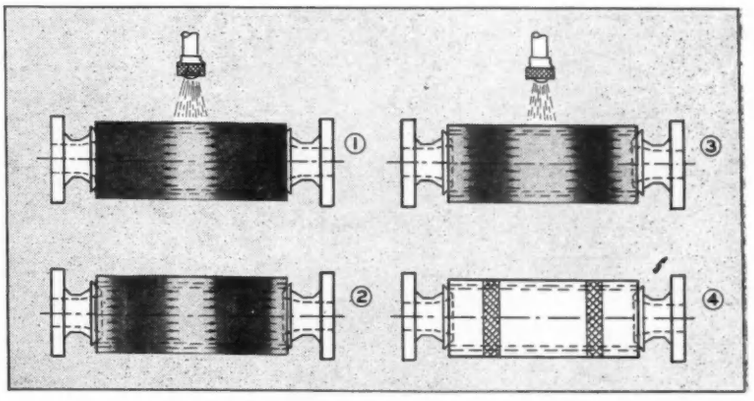


Fig. 3—Diagram showing the progress of cooling and solidification in a tube which is too long

Fig. 2—Very thin steel-back connecting-rod bearings with areas of failure adjacent to parting lines

These two phenomena observed with thin-wall bearings appear to be due to two causes.

If a roller under pressure is passed over a strip of thin steel, the strip will shortly begin to curl. In an engine, the "rolling-mill" action of the rotating crankshaft has the same effect on a thin bearing, and after a short time the "crush" is lost, the open sides of the bearing tending to close in and to hug the shaft. This effect probably occurs when the load on the bearing is in the neighborhood of the top or bottom center. At crank angles for which the instantaneous load is adjacent to the parting lines, the bearing is forced against its seat in the rod or cap. A deflection or fluttering effect is thus set up in the bearing wall, which induces fatigue in the bearing metal or the bonding medium. In addition, since the bearing is not firmly seated, an oil film is formed over the back of the bearing in the area of deflection, which impedes heat flow, and as a result, failure may be induced by excessive local temperatures.

The other cause seems to be the difference in the contraction of the babbitt and the steel shell on solidification after pouring, and the difference between their expansions in operation. A certain amount of distress in bearings is quite likely to be due to the relieving of these stresses in the form of cracks, after a certain

RESEARCH

Table I—Load Capacities and other characteristics of Bearing Metals

Description of bearing metal	Maximum permissible unit pressure	Minimum permissible Zn/Pmax	Maximum Pmax V	Oil reservoir temp.	Minimum crankshaft hardness	Affected by corrosion
TIN BASE BABBITT Copper 3.50% Antimony 7.50% Tin 89.00% Lead (max) 0.25%	1000 p.s.i.	20 Standard quality bearings	35000	235° Fahr.	Not important	No
TIN BASE BABBITT Same composition as above	1500 p.s.i.	15 Alpha Process	42500 quality bearings	235° Fahr.	Not important	No
HIGH LEAD BABBITT Tin 5 to 7% Antimony 9 to 11% Lead 82 to 86% Copper (max) 0.25%	1800 p.s.i.	10	40000	225° Fahr.	Not important	No
CADMIUM-SILVER Silver 0.75% Copper 0.50% Cadmium 98.75%	Over 1800 and up to 3850 p.s.i.	3.75	90000 and upwards	260° Fahr.	250 Brinell	Not likely if temperature is maintained as specified and proper lubricating oil is used
COPPER-LEAD Copper 60% Lead 40%	Over 1800 p.s.i.	3.75	90000 and upwards	260° Fahr.	300 Brinell	

period of operation. This differential expansion probably accounts for the loss in "spread" and associated premature cracking adjacent to the parting lines.

According to Mr. Willi, the strength and stiffness of the bearing structure must be sufficient so that the rolling-in action and the effects of differential expansion and contraction will be resisted. Definite improvement in bearing performance was obtained, he says, when excessively thin steel backs were replaced by backs whose thickness conformed to the following equation:

$$C = 86{,}670 \frac{t}{D} - 1386,$$

where C = 300 for plain, unflanged, steel-back, connecting-rod bearings;
= 1100 for plain, unflanged, steel-back, crankshaft main bearings;
= 2500 for plain, unflanged, bronze-back bearings, either rod or main;
t = minimum steel thickness;

D = outside diameter of bearing.

Values of t given by the above equation are considered to be the minimum permissible for use in cast-iron crankcases and steel connecting rods. Greater thicknesses may be used if desired, the only disadvantage being their greater cost. The same proportions have been used in aluminum crankcases, but additional stiffness is then provided by flanges on the bearings. Lining thicknesses used in conjunction with these back thicknesses are shown in Table II.

In the case of one engine in which the connecting-rod bearings did not show satisfactory life, analysis showed that the effective "in" pressure on the oil to the oil hole drilled in the crankshaft (represented by the difference between the pump pressure on the oil and the centrifugal force on the oil at the inlet) was materially less than the "out" pressure, represented by the centrifugal force on the oil at the outlet from the drill hole. In another engine the connecting-rod bearings showed a satisfactory life although the loading conditions were less favorable; in this case the "in" pressure on the oil exceeded the "out" pressure, and Mr. Willi concludes that for maximum bearing life there should be a condition of approximate equilibrium between the "in" and "out" pressures.

The life expectancy of a connecting-rod bearing may be reduced by restrictions in the feed grooves in the main bearings, and in Federal-Mogul's work the cross-sectional area of the feed groove is made equal to one-fourth the area of the drill-hole in the crankshaft leading to the connecting-rod bearing.

Oil in engine bearings has a two-fold function—to lubricate and to cool. If the oil is to serve efficiently as a coolant, it must circulate, and this calls for adequate clearance between shaft and bearing. In one instance where the life of a 4-in. bearing originally assembled with a clearance of 0.0015 in. was too short, satisfactory performance was obtained when the clearance was increased to 0.004 in.

Bearings made of babbitt of practically identical specifications, on backs of the same grade of steel, sometimes show widely different performances. These differences in performance evidently must be due to differences in the production processes. There are two basic methods of producing so-called precision-type, steel-back, babbitt-lined bearings. They may be made either from flat babbitted strip steel or from steel tubing which has the babbitt cast in centrifugally. In both cases there are possible variations in the preparation of the steel surface for babbitting and in the application of the babbitt. In order that bearings made

from steel tubing with the babbitt "spun" in may show an improvement over bearings made from strip stock, certain points must be observed with relation to the length of the tube, its preparation for babbitting, and the place of the back-grinding operation in the sequence of operations.

Table II
Lining Thicknesses for Different Shaft Diameters

Shaft Diameter, In.	Lining Thickness (Tin-Base Babbitt, High-Lead Babbitt, Cadmium-Silver) Minimum	Maximum
0 to 2½ in.	0.020	0.025
2 3/16 to 3 5/8	0.025	0.030
3 11/16 to 4 3/16	0.030	0.035
4¼ to 6	0.040	0.045
6 1/16 to 11	0.060	0.070

When a tube is being lined, solidification of the babbitt should start at the center and proceed toward the ends. To this end, an air blast or some other cooling medium is directed against the center, as shown in Fig. 3. This illustration also shows what happens if the tube is too long. Cooling and solidification then start both at the center and at the ends, and the babbitt will solidify last at from ½ to 1 in. from the ends. Where the babbitt solidifies last, shrinkage and porosity are likely to occur, resulting in an impairment of the bond, localized stresses in the babbitt, a poor babbitt structure, and early failure of the bearings made from these sections of the tube. These bearings naturally will show poor performance. The difficulty can be avoided by using shorter tubes, but this involves increased cost.

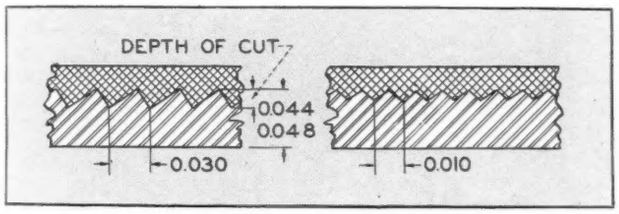


Fig. 4—Sections through bearings whose steel shells have been bored with a coarse and a fine feed respectively.

If the babbitt is to adhere well to the steel tube, the surface to be lined must be perfectly clean. The least expensive way of obtaining a clean surface is by pickling, but in applying this process allowances must be made for differences in the amounts of rust, grease and scale that may be present. The pickling time must be carefully adjusted to these surface conditions. The hazard involved can be largely eliminated by boring the tube, but this adds to the cost. The tubes may be bored with either a fine (about 0.010 in.) or a coarse (about 0.030 in.) feed. Certain advantages are offered by the fine feed, but it is more costly than either the coarse-feed boring operation or pickling. An additional advantage of the fine-feed boring operation is that it provides a larger bonding area than either of the other two processes.

A bearing with a finish-ground back might be expected to show a practically 100-per cent contact, but in practice this result is not always obtained. Poor back contacts are the result of finish-grinding the babbitted shell oversize before separating it into halves. The amount of oversize is governed by the stock removed when the shell is split. If the shell is ground oversize and the desired outside diameter is obtained by die-forming, the backs are not always true cylinders. Perfectly true backs can be obtained by grinding in halves, but this is more expensive than grinding the shell oversize in the full, followed by separating and forming.

Differences in the performance of bearings of any given material may be ascribed to variations in such factors as tube length, preparation of the tube before babbitting, and condition of the backs. The maximum permissible unit pressures given in Table 1 (1000 lb. per sq. in. for standard-quality tin-base babbitt) can be expected from bearings made to obtain the lowest possible cost. When made to obtain the highest possible life expectancy, the unit pressure can be increased 50 per cent, but the points mentioned must then be specially attended to, which adds to the cost. If the work to be performed is within the limits of the so-called standard-quality bearing, it is poor economy to use something more expensive. Where standard-quality babbitt bearings prove unsatisfactory, it is usual to change to a more expensive bearing material without fully exploring the possibilities of improvement by a change in processing methods involving only moderately-increased costs. The economy of such a change is questionable and the results often are disappointing.

The author said he was firmly of the opinion that some of the points in production technique discussed in the preceding paragraphs should be covered in the specifications under which bearings are purchased, so that both the quality and the price could be controlled.

Investigation Reveals Cause of Propeller Shaft Weakness

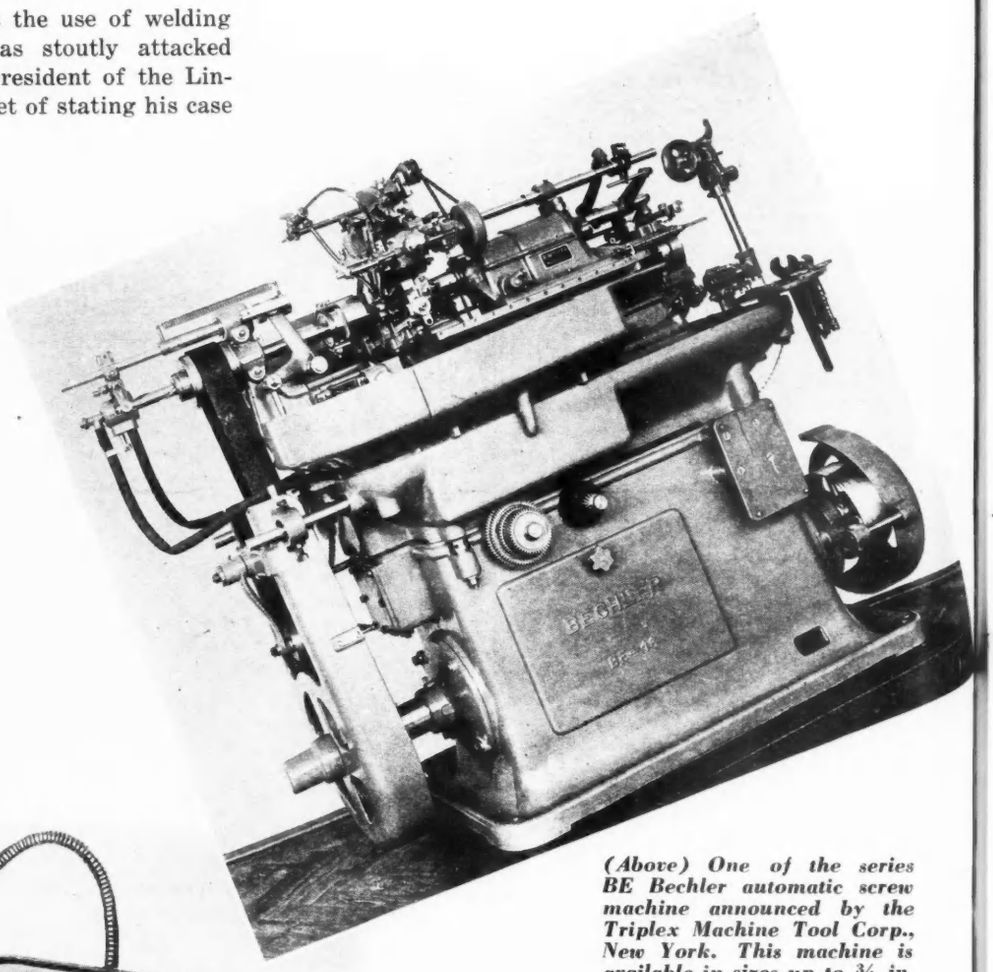
SHORT propeller shafts with upset, splined ends, used on German motorcycles, were found to break frequently at the point of transition to the enlarged, upset end section. An investigation showed that the break always occurred at a point where the section diameter was a minimum. Irregularity in the section diameter was due to the fact that the shafts were finished with emery cloth, the central section of the shaft and the fillet between this section and the upset end being finished separately. Thus a short length of the central section close to the fillet was finished twice, and its diameter thereby reduced by from 0.004 to 0.008 in. below that of the central section, which reduced its torsional strength correspondingly.

MEN and MACHINES....

PERSISTENT prejudice against the use of welding for certain applications was stoutly attacked recently by J. F. Lincoln, president of the Lincoln Electric Co. At the very outset of stating his case for welding, Mr. Lincoln submits the following points: The shielded arc deposited metal is definitely stronger than mild steel plate under all conditions; the shielded arc weld metal is a good deal more homogeneous than mild steel plate, hence less apt to defect; and, the making of a weld with the shielded arc requires very little skill, particularly in the down-hand position. Finally, says Mr. Lincoln, the chance of that weld metal being as good as the parent metal is tremendously better than the chance of the parent metal being as good as the weld.

There appear to be a number of persons in positions of authority who insist on limitations which are "neither necessary nor intelligent." Among several examples cited to back up this statement is the specification that the skin of a ship shall not be welded, in spite of the fact that the boilers inside the ship, carrying very high pressures, are welded. Requirements still call for the riveting of many types of pressure vessels, yet 30,000,000 automobiles in the United States depend for their success on untested welds.

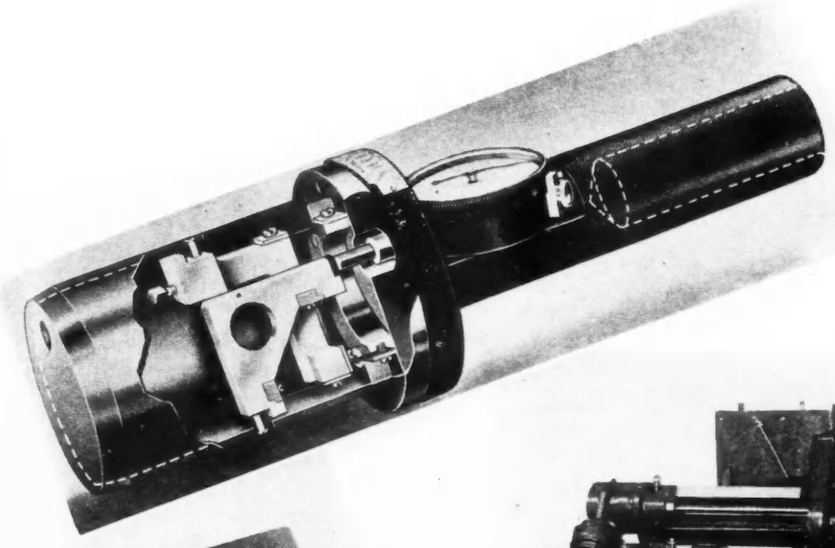
Lincoln's president points out that perhaps because welding is a new industry the added care which such "frequently silly" requirements enforce is in the right direction. He cautions, however, that unless this "insanity" is stopped at some reasonable point, the cost of fabrication will be unnecessarily and unduly increased.



(Above) One of the series BE Bechler automatic screw machine announced by the Triplex Machine Tool Corp., New York. This machine is available in sizes up to ¾ in. capacity.

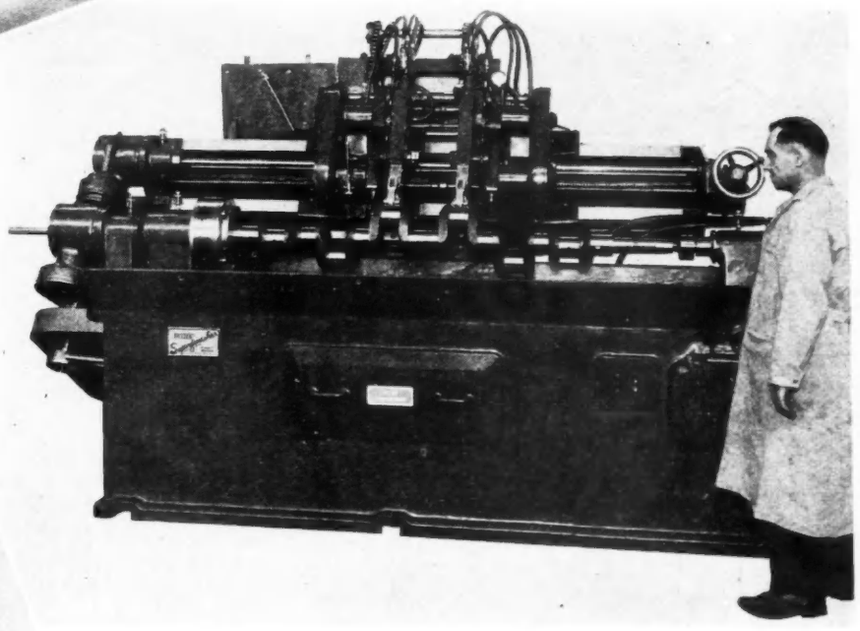
(Left) New type honing machine manufactured by the Honing Equipment Corp.

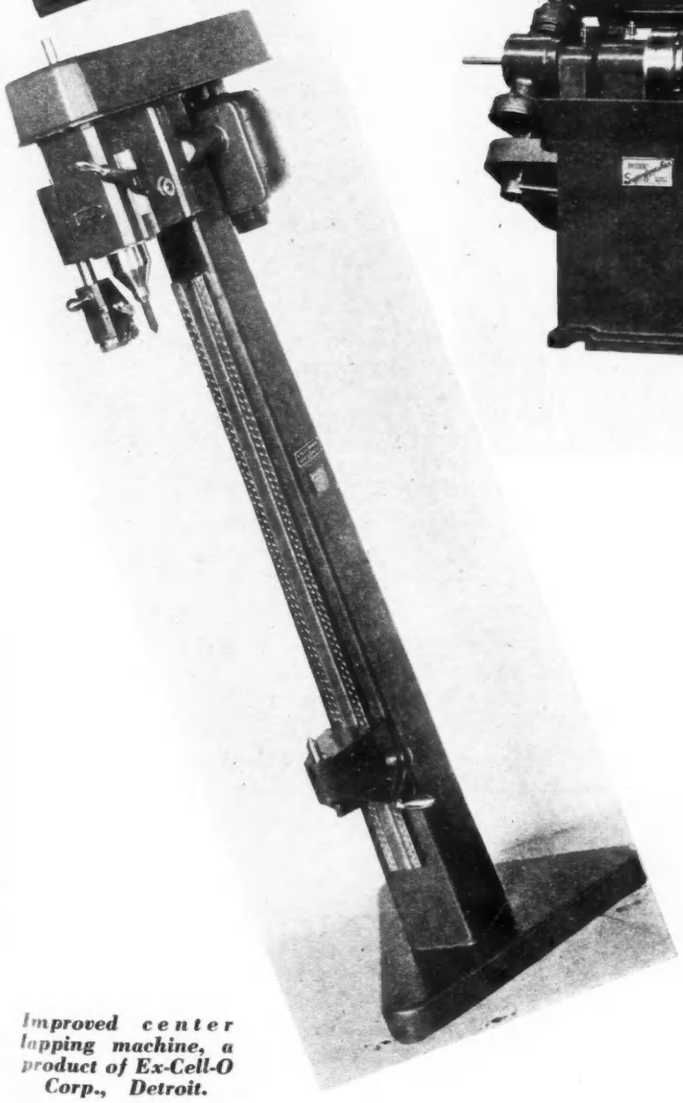
J. F. Lincoln says that "It is probably more difficult to make a weld which is worse than the parent metal than it is to make one which is better"



(Left) Latest model indicator plug gage built by the Sheffield Gage Corp., Dayton, Ohio.

(Below) Crankshaft Superfinisher for pinbearings, recently manufactured by the Foster Machine Co. for the Caterpillar Tractor Co.





Improved center lapping machine, a product of Ex-Cell-O Corp., Detroit.

Those who are suspicious of welding frequently claim that welding is satisfactory only if the operator doing the work is sufficiently skilled and careful. In many cases the operator must be tested every few months, or even days, in order to satisfy the inspector. Mr. Lincoln doubts if this is necessary. "It is probably a good deal more difficult," he says, "to make a weld which is worse than the parent metal than it is to make one which is better. With the proper electrode, proper size and type of welding machine, and proper oversight by the foreman, it is a practical impossibility for any weld to be made which will not be better and more reliable than the metal itself."

Support for this claim is provided by the results of tests made with 14 men in one class of the welding school at the Lincoln Electric Co. plant in Cleveland. Not one of these men had previous welding experience. The test called for preparation of plates to be welded. The welding machine was properly

set and the proper size of electrode was given to the operator. He was given 15 minutes' instruction in holding the arc, and then he proceeded to make a standard test sample of all deposited metal of ½-in. diameter and a length of something more than 2 in., with two ends arranged for clamping in a standard tension machine. At the end of two weeks he made another sample in exactly the same way, and at the end of his four weeks' course made the third sample.

From these tests the following conclusions were drawn: The welds made by novices who never had any experience before would have withstood all commercial requirements; a very wide variation occurred in these tests, caused largely by impurities in the plate being carried over into the deposited metal, not by difference in skill; and, the weld metal is, under all conditions, better than the parent plate.

From the foregoing it appears reasonable that with proper type and setting of machines, proper size of electrodes and proper visual inspection of the weld after completion, satisfactory welding can be done regardless of the training of the operator. Mr. Lincoln's final comment on the subject was that "If other investigation or testing is to be done to assure the reliability of any welded structure, the plate should be the thing examined more than the weld."

At the top of the heap of the current batch of new

(*Turn to page* 144, *please*)

Production Lines . . . .

Power Transmission

Concluding a very unusual presentation on the outstanding forms of transmissions used in motor trucks and buses both here and in Europe, Col. G. A. Green of Yellow Coach, made the significant statement that, in his opinion, the industry would see a wider use of fluid flywheels in combination with conventional transmissions. A week later, again on the occasion of the recent SAE Congress, W. S. Knudsen, speaking at the Detroit banquet, made a strikingly similar statement. All of which indicates to us that important transmission developments really are on the way. Perhaps we may see some of these incorporated in '40 models.

For Diesels

Recent issue of *Tool Tips* describes some rather amazing developments in broach making. They show a large group of extremely fine hole broaches used for finishing Diesel spray nozzle parts. Longest of the broaches is about 4½ in. long, of four-spline form with an O.D. of only 0.094 in. It has 120 teeth, spaced 0.040 in. apart. Here is the acme of production tool making, considering the size of the work and the exceedingly fine limits on dimensions.

Two-Speed

Seemingly one of the most popular of the special equipment items on heavy-duty transport vehicles is the two-speed axle. Apart from the economy gained through its use, popularity of the unit rests to a large extent upon the dependable quality built into the widely used gear sets. Some of this may be appreciated upon reading the current issue of the *Timken Axle News* which is devoted almost entirely to a discussion of the two-speed axle and its advantages.

New Production

Had the pleasure recently of going through the remarkable new plant recently erected by Carboloy. Its primary function has been to lift cemented-carbide manufacture from the category of a laboratory-made product to one that can be made in mass production, with a high level of quality and correspondingly favorable cost. Out of the many processes that abound at every turn, we were particularly impressed with one that may have other applications. Research has found a way of cutting cost in the manufacture of drawing dies. They use a large cylindrical steel bar of appropriate size, heat it, then press a Carboloy nib right through its heart. It is remarkable to note how easily the hard insert penetrates. The mechanics of this principle are well worth further study.

Cutting Fluids

A cutting fluid specialist for whom we have high regard tells us of some recent production applications where he has recommended the use of cutting oils for certain grinding operations. This may sound startling to those who have been using extremely weak soluble oil mixtures for this purpose for many years but apparently there are places where the more expensive material can well justify its use.

Big Plastics

About six or seven years ago we recall conversations with experts in the field of plastics concerning the practicability of molding large sections for use in body construction. In those days when even the all-steel body was not yet a universally accepted idea, the answer was almost emphatically No. A lot of water has passed under the bridges and over the new dams since then. From what we hear off the record, big plastic sections no longer are an idle dream. You may hear a lot about this within the next year to come.

Disc Brakes

One of our friends who is concerned with new developments tells us that a parts maker in Michigan is working on a disk brake for wheel drums. It is said to be very effective and may be actuated by any modern means—mechanical, hydraulic, or pneumatic. We are advised that some vehicles equipped with these brakes are going through their paces on the highways.

—J. G.

MORRIS SIX-CYLINDER 215 Cu. In. TRUCK ENGINE

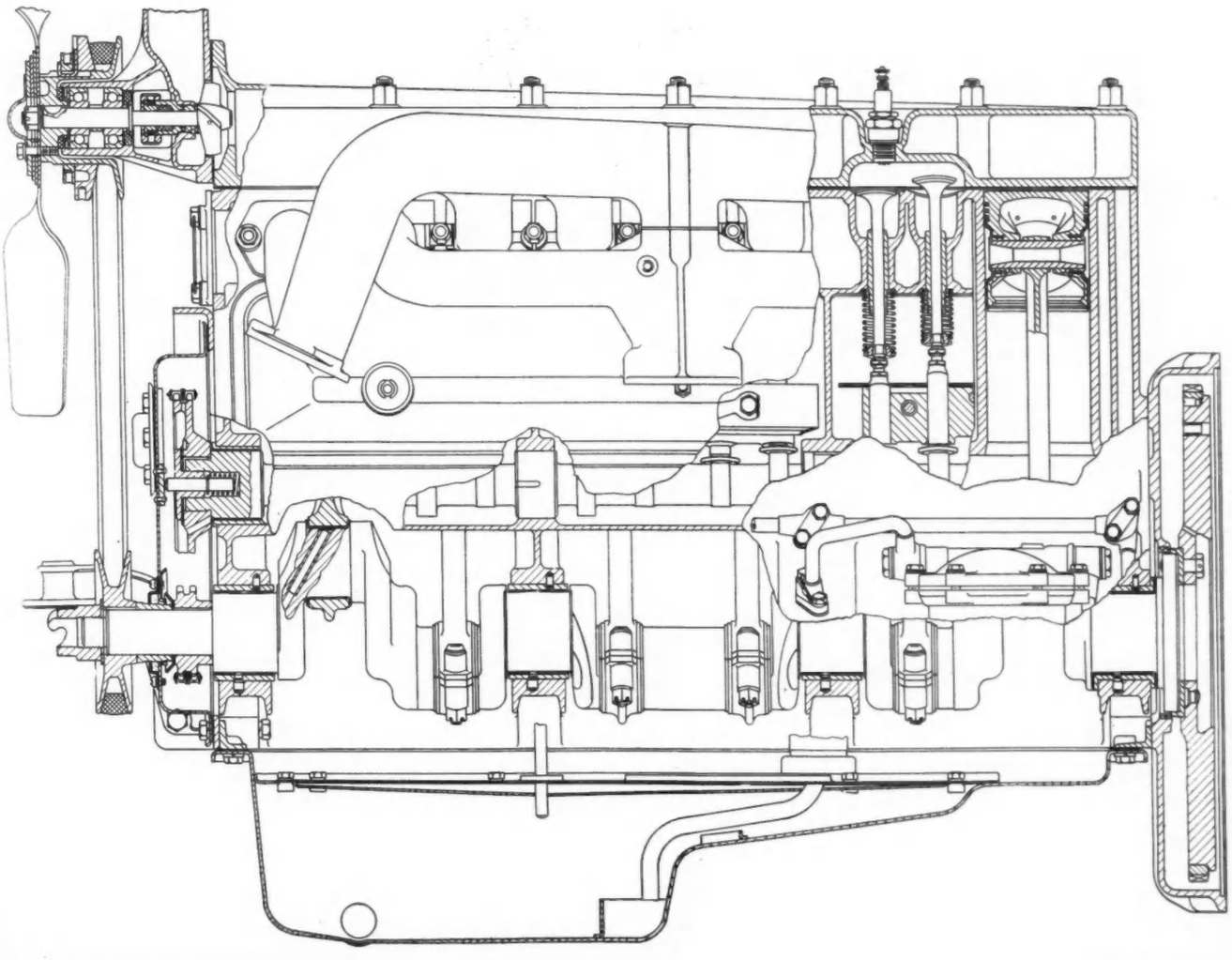
Longitudinal Section

MORRIS Commercial Cars, Ltd., Birmingham, England, produces five models of truck chassis which are equipped with three different engines. The engine shown by the accompanying drawings is the six-cylinder as fitted optionally to 1½ and 2-ton chassis.

With a bore and stroke of 82 by 100 mm. (approximately 3¼ by 3 15/16 in.), giving a piston displacement of 214.7 cu. in., this engine, with a compression ratio of 6, develops 60 hp. at 3000 r.p.m., a maximum torque of 135 lb-ft. at 1000 r.p.m., and a maximum b.m.e.p. of 95 lb. per sq. in. The lowest consumption is 0.575 and the consumption at the peak of the horsepower curve, 0.625 Imp. pints per b.hp.-hr. (approximately 0.62 and 0.68 lb. per b.hp.-hr.).

The same engine with certain changes in design is standard equipment of the 3-ton and 5-ton chassis. As fitted to the 3-tonner, the output is 70 b.hp., while as built for the 5-tonner, with austenitic cylinder liners and Stellite valve-seat inserts and valve tips, the output is 80 b.hp.

Pistons are of the Flower bimetallic type (aluminum



MORRIS SIX-CYLINDER 215 Cu. In. TRUCK ENGINE

Transverse Section

with steel skirt), with one oil-control and two compression rings, all above the piston pin, which latter is clamped in the small end of the connecting rod.

The cylinder head and the block and crankcase unit are in cast iron. Water circulation is by thermo-siphon assisted by a belt-driven impeller at the front of the cylinder head, in tandem with a four-bladed, ball-bearing fan. The V-belt has a flanged driven pulley for adjustment.

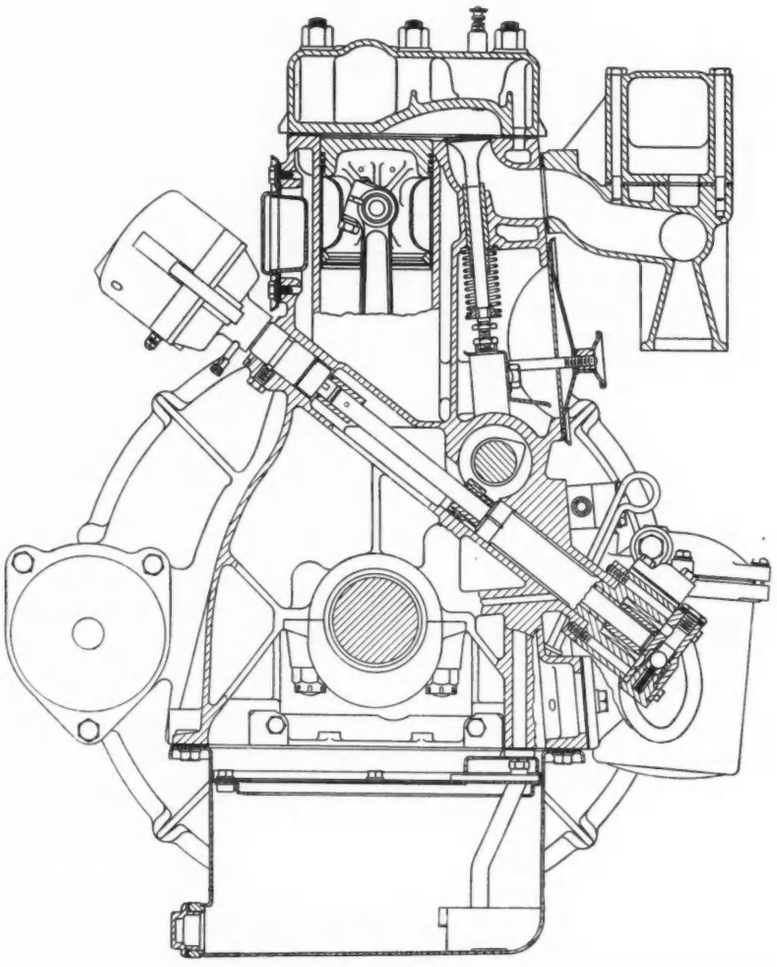
With four bearings, white-metal lined bronze, the crankshaft has journals of 2 7/16 in. and pins of 2.16 in. diameter. Journals are 2 in. in length and pins 1⅜ in. The four-bearing camshaft has duplex roller-chain drive.

Ignition is by Lucas battery-coil system with centrifugal and over-riding manual control. The distributer head, high on the right, and the oil pump, low on the left, are driven by an inclined shaft passing between the two rearmost cylinders.

A 1 3/16-in. Solex carburetor is used, with hot-spot manifold and fuel feed by autovac, the latter still being a feature of all Morris commercial models.

Lubrication is by pressure to the camshaft, crankshaft and big-end bearings; an oil drain from the front camshaft bearing serves for the distribution chain. Filtration is by a gauze tray over the sump and a cartridge-type filter on the pressure side of the pump. With flywheel, the weight of this engine is 554 lb.

At extra cost, cylinders liners, stellite-faced exhaust valve seat inserts and a Solex governor carburetor can be had on the 1½ and 2-ton chassis.



Monthly Production Feature

(*Continued from page* 111)

machine is stopped, the cradle locked against turning, and the centers are drilled and countersunk.

Cast Crankshafts

One of the most startling developments in recent years was the adoption of cast crankshafts by Ford, first for V-8 engines, later for the Lincoln-Zephyr V-12.

Over a period of the past few years, this design has given an excellent account of itself not only in service but in economy of overall manufacturing costs.

The Campbell, Wyant and Cannon Foundry Co., Muskegon, Mich., has been producing cast alloy iron crankshafts for several years, experimentally and in production lots for various in-line engines, and has made cranks for some of the largest Diesel engines in use today. It is of interest to note that the special alloy irons made under the trade name "Proferall" are produced in two different analyses—one for large shafts, the other for small automotive shafts.

For the large crankshafts the composition is:

Carbon	2.75 per cent
Silicon	1.90 per cent
Manganese	0.75 per cent
Nickel	1.50 per cent
Molybdenum	0.75 per cent

For small cranks the analysis is:

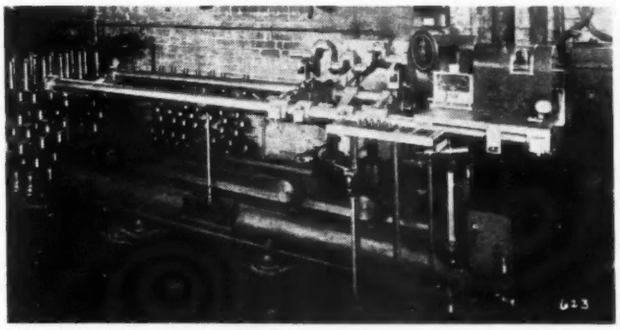
Carbon	3.00 per cent
Silicon	2.30 per cent
Manganese	0.55 per cent
Nickel	1.00 per cent
Molybdenum	0.50 per cent

In both types the sulphur is 0.08 per cent maximum, and the phosphorus 0.20 per cent maximum. The metal is duplexed in the cupola and electric furnace. Tensile strength is given as 50,000 pounds per square inch minimum; the Brinell hardness number, 230 to 280.

SUMMARY—The foregoing provides a high-spotting of current developments in crankshaft forging practice, with emphasis upon present-day machining practice in outstanding automotive plants.

For a complete picture of machine shop practice we refer the reader to the official factory routings reproduced here. It may be noted that these routings touch on operations of diverse character and provide a good cross-section of activity in the industry.

The text is supplemented by a comprehensive pictorial section which affords a good high-spotting of certain types of equipment currently in use in the establishments mentioned specifically in this study.



Tinius Olsen dynamic balancing machine in use at Minneapolis-Moline plant has extra long bed for variety of crankshafts

Caterpillar Crankshaft Factory Routing

OPERATION	EQUIPMENT
Cheeks, turn and fillet center main and 2 intermediate main bearings	34 in. Wickes Duplex type crankshaft lathe
Cheek, turn and fillet front main bearing and form stub end; cheek, turn and fillet rear main bearing, rough turn, straddle face, and form flange	Model CH-4 Wickes center drive crankshaft lathe
Turn No. 1 and No. 4 pin bearings	34 in. Wickes Duplex type crankshaft lathe
Turn No. 2 and No. 3 pin bearings	34 in. Wickes Duplex type crankshaft lathe
Drill, counterbore and tap stub end	21 in. Cincinnati-Bickford Super Service drilling and tapping machine
Recenter stub end	24 in. x 7 ft. 10 in. American engine lathe
Straighten if necessary	50-ton Logeman vertical hydro press
Rough grind front and rear main bearings	18 in. x 6 ft. Norton cylindrical crankshaft grinder
Form 1 undercut and chamfer stub end	17 in. x 4 ft. 3 in. LeBlond engine lathe
Finish turn flange	24 in. x 7 ft. 10 in. American engine lathe
Drill 2 oil holes for center pin bearings and drill 2 oil holes for end pin bearings	No. 2 Leland-Gifford oil hole drilling machine—2-spindle
Grind No. 1 and No. 4 pin bearings	Type B-181 Norton cylindrical grinder

OPERATION	EQUIPMENT
Drill, countersink and tap flange holes	No. 25-24 Foote-Burt Heavy duty drill single spindle 3 ft. Carlton radial drill
Grind No. 2 and No. 3 pin bearings	Type B-181 Norton cylindrical grinder
Grind front, rear and center main bearings	14 in. x 36 in. Norton Type "A" cylindrical grinder
Grind 3 diameters on stub end	14 ft. x 36 in. Norton cylindrical grinder
Grind 2 intermediate main bearing diameters	14 ft. x 36 in. Norton cylindrical grinder
Rough and finish grind taper on stub end	14 ft. x 36 in. Norton cylindrical grinder
Cut 2 keyways—one on gear diameter and one on taper diameter	No. 2 Kent-Owen hand mill
Mill oil return thread on flange end	No. 12 Lees - Bradner heavy duty thread mill
Mill small thread on stub end	No. 12 Lees - Bradner heavy duty thread mill
Mill oil return thread on stub end	No. 12 Less-Bradner heavy duty thread mill
Finish face flange	American engine lathe
Polish and lap all main and pin bearings and burr and tap oil holes	American engine lathe
Chamfer and retap flange holes, retap stub end, remove burrs and oil complete and tape 2 main bearings	Floor

Diesel-Powered Fiat

By RAFFAELE SANSOME

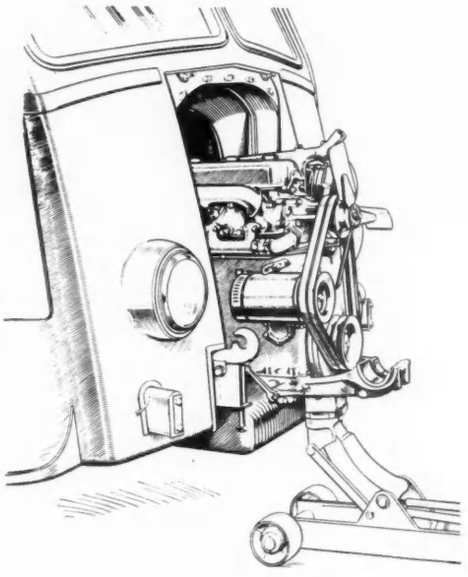
UNDER decree No. 1805, promulgated by the Italian Government on July 14, 1937, motor trucks conforming to certain specifications making them adaptable for military uses, are exempt from the registration tax for one year and are entitled to a reduced transportation of tax of only 0.05 lire per ton-kilometer. To take advantage of these regulations the Fiat Company produced its Model 626N 3-ton truck, of which a number of illustrations are shown herewith. It is equipped with a six-cylinder Diesel engine of 3.94 in. bore by 4.80 in. stroke (350 cu. in. displacement) operating with a compression ratio of 18:1 and developing 70 hp. at 2200 r.p.m. The fuel consumption with full load and at a speed of 40 m.p.h. is given as 25 liters per 100 km. or 9.4 miles per U. S. gallon.

The engine block is provided with replaceable liners of alloy iron. There is a torsional vibration damper on the seven-bearing crankshaft. A centrifugal governor limits the speed of the engine. The radiator is of the sectional type, having seven detachable sections and being provided with air deflectors (a shroud?—Editor). A thermostatic valve with by-pass, in the cooling system, helps the engine to attain its normal working temperature quickly. Three-point mounting is employed, the two rear supports being through rollers running on suitable guides, so the powerplant can be rolled out of the chassis through the front.

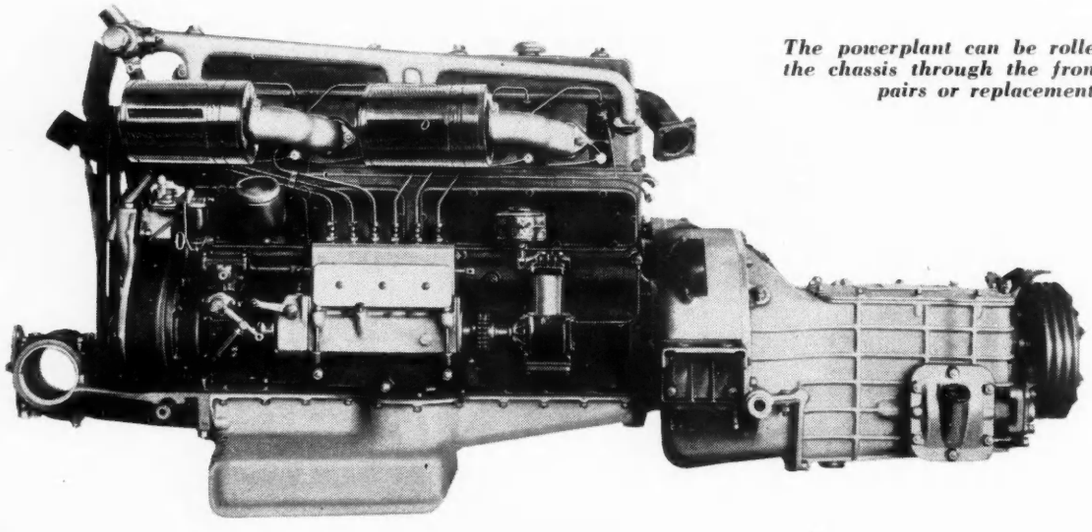
A five-speed transmission is fitted, the three higher speeds being through helical gears for silent operation. It is claimed that in low gear the truck can negotiate a 28 per cent grade under full load.

This truck has a wheelbase of 118 in., a track of 67 in. in front and 63.5 in. at the rear, and its turning radius is 18 ft. The chassis alone weighs 5600 lb. and the pay load is 6600 lb. An additional load of 14,300 lb. can be carried on a four-wheel trailer.

Among the special features of this new truck are its high power-to-weight ratio, high speed, great drawbar pull, ample steering lock, easy handling, and short wheelbase and over-all length, which latter are made possible by placing the cab over the engine (or the engine centrally within the cab). The standard body has a loading capacity of about 10 cu. yds. Other mechanical features include a clutch which can be removed without taking down the gearbox, a full-float-



The powerplant can be rolled out of the chassis through the front for repairs or replacement

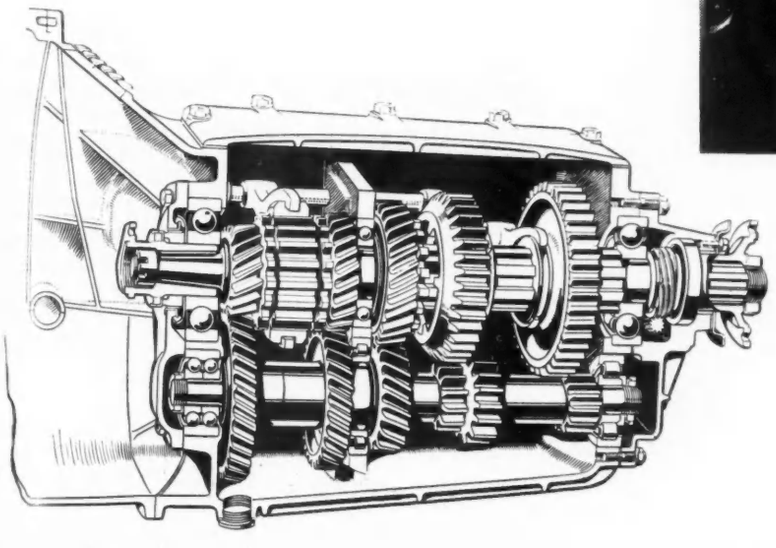


The six-cylinder Diesel has 350 cu. in. displacement and a compression ratio of 18:1.

has high power to weight ratio

ing rear axle, hydraulic brakes applied by compressed air, with direct mechanical control for emergency; a differential lock as an optional extra, a worm-and-roller steering gear, and wheels with three-piece aluminum-alloy rims to facilitate tire changes.

The engine is centrally located in the cab for accessibility and shorter turning radius.

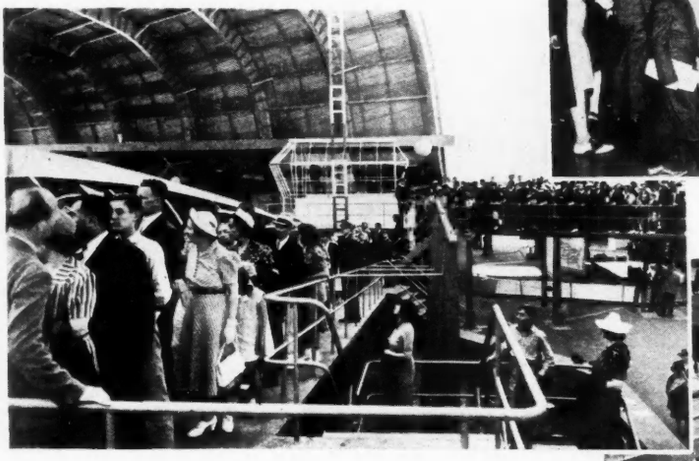


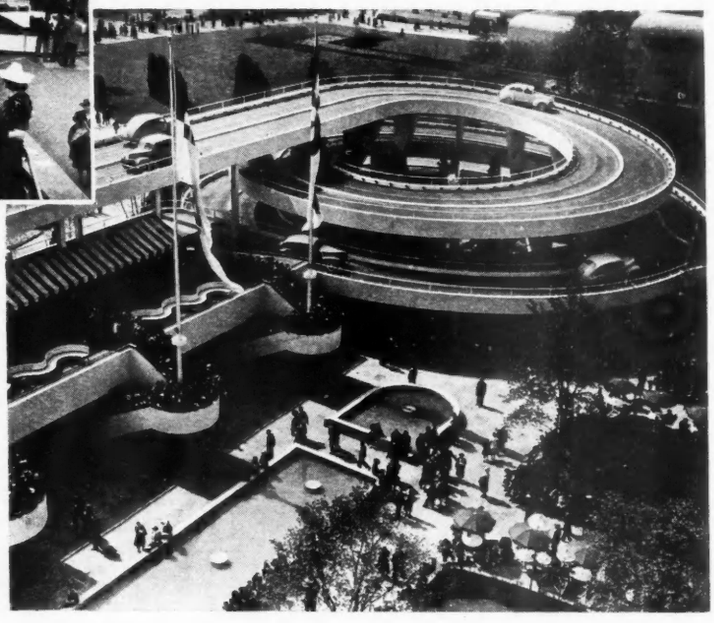
(Left) The five-speed transmission. The three higher speeds are through helical gears

The Fair - Automotive

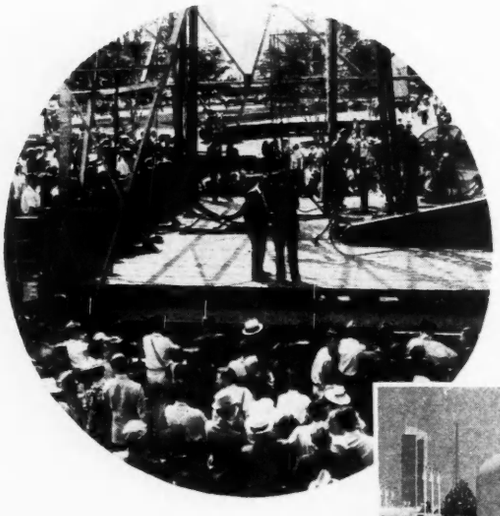
The talking car at the Chrysler exhibit in the New York World's Fair is almost uncanny with its answers to questions put to it. The magic is so performed as to make visitors return time after time.

Below is a view taken at the Curtiss-Wright display. It is inspected by more than 35,000 people each day.

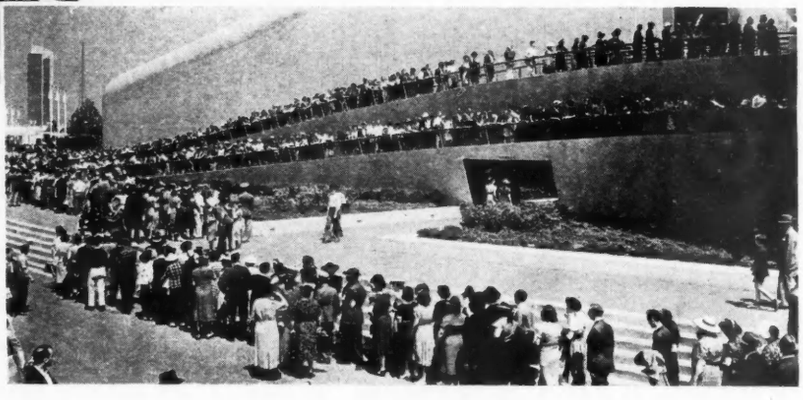




A huge derrick in operation at the Petroleum Building is the center of much interest. A loud speaker explains what is going on.



At the Ford exhibit 1400 people an hour can be carried over this ramp in Ford cars to get a bird's-eye view of the grounds.



Long lines wait for a chance to see the "World of Tomorrow" at the General Motors "futurama." The capacity of the traveling seats from which it is viewed is 27,000 per day.

NEWS OF THE INDUSTRY

Two Tractor Builders Develop New Models

International Harvester Co. and Minneapolis-Moline Add to Lines

Following close on the heels of the Ford Motor Co.'s formal announcement of its new type lightweight tractor, two leading farm equipment manufacturers have announced new tractor models. Minneapolis-Moline Power Implement Co., Minneapolis, Minn., calls its latest design the Universal "R" tractor, while International Harvester Co., Inc., Chicago, designates its newest unit as the McCormick-Deering Farmall-A.

The Universal "R" is a two-row tractor supplied with or without cab. It is powered by a 4-cylinder engine with bore and stroke of 3⅝ in. by 4 in., respectively, and a maximum governed speed of 1400 r.p.m. Piston displacement is 165.1 cu. in. The transmission provides four speeds forward, one reverse, as follows: Low, 2.3 m.p.h.; Second, 3.3 m.p.h.; Third 4.2 m.p.h.; Fourth, 12.0 m.p.h.; and Reverse, 2.6 m.p.h. Specifications give a draw bar horsepower of 14 and a belt horsepower of 18.

Rear wheels of the Minneapolis-Moline tractor are clamped on live axles mounted on tapered roller bearings with 12 in. disk type brake located within the rear axle housing which may be operated separately for extremely short turns, with a 7½-ft. radius possible, or together with one foot for stops. The rear steel disk center wheels

(*Turn to page* 138, *please*)

For Disaster Service

Pride and joy of the Portland, Oregon, fire department is this 12-ton truck known as the Jay W. Stevens Disaster Service Unit. The vehicle is equipped to cope with every conceivable type of disaster on land or water and contains portable two-way short wave radio units and 1200 separate items of equipment.

FTC to Study Distribution Methods of Tire Makers

Now Appears That Subject Will Be One Of First Up for Consideration in 1940

A Federal Trade Commission investigation of distributing methods employed by automobile tire manufacturers, proposed in a resolution sponsored in the House by Representative John A. Martin, Democrat of Colorado, will receive no further consideration in Congress until next January despite the FTC's willingness to conduct the inquiry and despite the recent action of some Southern independent tire dealers

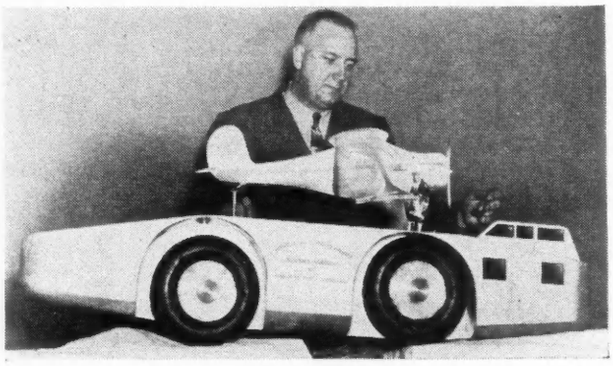
(*Turn to page* 138, *please*)

IHC's Farmall-A

The International Harvester Co.'s new tractor powered by a four-cylinder, valve-in-head engine which may be equipped with combination manifold for distillate or kerosene.

MM's Universal "R"

Minneapolis-Moline Power Implement Co.'s newest two-row tractor is also powered by a four-cylinder engine. The unit can be supplied with or without cab.



Acme

For the Antarctic

Dr. Thomas C. Poulter, of the Armour Institute of Technology, Chicago, shown with a model of the $150,000 "Snow Cruiser" he designed for an expedition that will sail in October to claim part of the Antarctic region for the United States.

GM's 1940 Production Program Impeded by UAW-CIO Strike

Decision of UAW-AFL Packard Local to Join CIO Seen As Serious Blow to Martin Faction

With the extent of delays in General Motors Divisions' 1940 model production season entirely dependent upon how soon a successfcl termination could be brought to the UAW-CIO strike of tool and die and maintenance workers in 11 key plants, only slight progress had been made as this was written in bringing the management and the union together. While daily conferences between representatives of both sides had failed to develop a satisfactory solution, a forward step was the decision to drop the demand for a supplemental agreement, to which the corporation was unable to accede because of the jurisdictional dispute between the two factional groups in the UAW. Attempts were made to negotiate with the union demands within the framework of the existing agreement between the corporation and the UAW, an agreement in effect since before the union was divided into CIO and AFL factions.

Early settlement of the strike could permit complete resumption of preparations for 1940 model production with comparatively minor effect on the scheduled program but continued stringing out of negotiations would affect the program in direct proportion to the time lost. While the strike, which began on July 6, originally affected only several thousand skilled workers, its continuance threatened thousands of production workers dependent for work upon completion of the retooling program.

Decision on July 18 of the powerful UAW-AFL Packard Local to desert the AFL and affiliate with the CIO dealt a serious blow to the Homer Martin faction of the UAW as the local was one of the largest and wealthiest of the groups which had supported him. Two reasons were given by leaders of the local for the decision. First of all the present agreement with Packard had become largely inoperative because of inability of the management to recognize either faction of the union to the exclusion of the other and decision to affiliate with CIO therefore eliminated any factional disputes insofar as Packard workers are concerned. Secondly leaders voiced criticism of the AFL attitude, declaring that the AFL leadership was still interested in craft unionism and was supporting the Martin UAW faction only because of its nationwide fight with the CIO.

Six Months' Retail Sales Top Last Year by 43%

Retail sales of passenger cars and trucks during the six months ending with June totaled 1,686,123 units, according to the Automobile Manufacturers Association. This represents a gain of 43 per cent by comparison with the like period of last year.

June sales of 254,304 passenger cars and 47,067 trucks, or a total of 301,371 units, represents an advance of 59 per cent over June 1938, with passenger cars gaining 63 per cent and trucks gaining 39 per cent, respectively.

Compared with May this year, car sales declined about 8 per cent, while commercial vehicle sales increased two per cent. The net result was a decline of 7 per cent for the month in sales of motor vehicles of all types.

Only four times in the past decade have June sales been higher than those of May, which is usually considered to be the peak month of the retail selling year. Passenger car sales, which are apt to be the more changeable, have advanced in June over May five times in the decade, trucks only once before.

Rims Inspected And Approved

Rims inspected and approved for the month of June, 1939, numbered 1,019,626 as reported by the Tire & Rim Association. This was approximately double the number reported for June, 1938.

For the first six months of 1939 rims approved numbered 8,498,363, also almost double the number reported for the first six months of 1938.

Ford Spends $500,000 on New Car Delivery Building

A new car delivery building to cost approximately $500,000 is under construction at the Rouge plant of the Ford Motor Co. The new building will be ready for use before autumn.

The structure will replace a smaller building now in use and provide more adequate facilities for handling car distribution from the Rouge plant to dealers in Michigan, Ohio, western Pennsylvania, West Virginia, northern Kentucky and Indiana.

Inquiries on Purchase Of Pierce-Arrow Plant

Several inquiries regarding taking over a portion of the Pierce-Arrow Motor Corp. plant in Buffalo, N. Y., for manufacturing purposes have been received in recent months, according to officials in charge of liquidation.

None of the companies making in-

Car and Truck Production

(U. S. and Canada)

	June 1939	May 1939	June 1938	Six Months 1939	Six Months 1938
Passenger Cars—U. S. and Canada					
Domestic Market—U. S.	233,311	222,909	123,333	1,479,396	827,085
Foreign Market—U. S.	13,393	14,961	13,198	98,303	109,432
Canada	10,585	11,585	11,014	69,968	76,102
Total	257,289	249,455	147,545	1,647,667	1,012,619
Trucks—U. S. and Canada					
Domestic Market—U. S.	49,025	47,092	27,927	299,133	190,150
Foreign Market—U. S.	13,991	12,546	10,212	76,703	76,676
Canada	3,930	4,121	3,718	23,787	26,056
Total	66,946	63,759	41,857	399,623	292,882
Total—Domestic Market—U. S.	282,336	270,001	151,260	1,778,529	1,017,235
Total—Foreign Market—U. S.	27,384	27,507	23,410	175,006	186,108
Total—Canada	14,515	15,706	14,732	93,755	102,158
Total—Cars and Trucks—U. S. and Canada	324,235	313,214	189,402	2,047,290	1,305,501

quiries has as yet placed definite commitments but it is entirely possible that at least a part of the huge plant will be in use by some manufacturer by the end of the year.

Meanwhile, sale of the old Pierce-Arrow equipment and machinery is continuing with shipments being made to England, Australia, Canada and all parts of the United States. Officials in charge of liquidation believe the program will be completed within a few weeks.

GM's Overseas Sales In June Top '38 by 3.4%

Sales of General Motors cars and trucks to dealers in the overseas markets during June totaled 30,714 units, representing an increase of 3.4 per cent over sales in June of last year.

In the first six months of 1939, sales of 194,508 units represented an increase of 1.6 per cent over sales in the first six months of 1938.

Steel Market Sees Probable Early Fall Output at 60 p.c.

Movement of Metal to Body Plants Encouraging Despite Labor Troubles

Although an undercurrent of uneasiness pervades the steel market because of the labor troubles in the automotive field, the rate at which specifications are coming through has not been affected so far. Parts makers have been calling for encouraging tonnages of both hot and cold rolled strip steel.

While Wall Street pounced upon the gain in the rate of employed ingot capacity, which according to the American Iron & Steel Institute now stands at the 1939 high of 56.1 per cent (week of July 20), as the signal for an upturn in security prices, the steel market accepted this statistical showing as nothing more than evidence of the correctness of former forecasts. When one of the Detroit district steel mills stepped up its primary operations to 75 per cent of capacity immediately following the Fourth of July holiday, it became obvious that, in spite of numerous setbacks, automotive consumption once again had assumed its traditional function of accelerating the steel industry's pace.

Operations in the Buffalo steel producing area moved from little more than one-third to nearly one-half of capacity, and while this gain is ascribed to miscellaneous orders, much of the business placed is automotive in character. With the better showing made generally, the probability of a 60 per cent rate of operations being reached late in August or early in September is gaining strength. In spite of some instances of suspensions of shipping orders because of labor troubles, the movement of steel, as a whole, to body plants and parts departments is encouraging, although not quite as extensive as it would have been, had it not been for these interruptions. Here and there the prices, at which much of the flat rolled steel now on mills' order books has been sold, continue to come in for adverse comment, but this is water over the dam, and if operating rates continue to show gains, a more cheerful attitude is certain to develop.

Recent statistical developments served to fortify prices of tin as well as those of copper. The world's visible supply, according to figures cabled by the statistical office of the International Tin Research and Development Council at The Hague, at the end of June was 28,831 tons, compared with 38,366 tons at the end of February. More detailed statistical information regarding stock of tin will henceforth be published monthly. World stocks of refined copper decreased 7228 tons in June and stocks of refined metal in the United States decreased 2143 tons, but there are still 335,012 tons of refined copper in first hands, representing approximately five months' output at the present rate of copper production. The copper market was steady at the unchanged price of 10¼ cents for spot electrolytic.—W. C. H.

French Cross-Country Tractor

The above photograph shows the Latil eight-wheel-drive cross-country tractor Type M4TX, which is steered by means of the forward and rear wheels. The tractor has a six-cylinder 4.93 by 6-in. engine rated 140 hp. at 1800 r.p.m. The clutch is of the double-disc type and the transmission gives eight forward speeds. There are four differential gears, one for each axle. Service brakes acting on all eight wheels are applied by means of vacuum boosters. There is, in addition, a parking brake acting on a drum on the transmission and through it on all eight wheels. To permit the wheels the greatest possible freedom in accommodating themselves to irregularities of the terrain, the suspension springs are divided into two groups, front and rear. The two springs of each group are interconnected by a system of links and springs which permits one wheel to rise while the other drops, at the same time maintaining an equal division of the load between all wheels. It is also possible for one of the axles of each group to assume a slightly inclined position while the other axle is inclined in the opposite direction. A winch located on the rear part of the chassis permits of maneuvering of guns and of the chassis itself. A maximum pull of 22,000 lb. can be exerted on the cable.

This tractor may be loaded to a gross weight of 12 (metric) tons and, in addition, will haul a trailer load of 15 tons. In low gear it is said to be capable of ascending a 46 per cent grade at a speed of 1 m.p.h. The tractor is being manufactured by Automobiles Industrials Latil, Turesnes (Seine) France.

See '40 Frame Business On Par with 1938-1939 Season

A. O. Smith Corp. officials report that volume of frame business on 1940 models will be about the same as for the 1938-39 season. Tooling for the new frames is being completed with a small volume of new frames in production.

AUTOMOTIVE INDUSTRIES

Summary of Automotive Production Activity

BUSES Operating rates have taken a slight turn upward in several plants. Officials seem to be more encouraged with the prospects for fall business.

TRUCKS Generally improving conditions are likewise noted in this field. Sales for heavy equipment are reported in some quarters as especially favorable.

TRACTORS Six companies have within recent weeks announced new tractors for small farms at prices ranging between $500 and $600. Others are said to be preparing to enter this field.

AUTOMOBILES With estimates of car and truck production for the weeks ending July 22 and July 29 at 41,000 and 30,000, respectively, it appears that production for the entire month will be fairly close to 180,000 units.

MARINE ENGINES Deliveries in the East are said to be on the increase, both for cruisers and work boats. Some stepping up of output of outboard motors is noted.

AIRCRAFT ENGINES Factories are still on heaviest production schedules in recent years, and some have exceeded all past records in output. Backlogs are increasing, yet few companies are said to be seriously considering expansion programs, hoping to satisfy the demand with their present plant investment.

This summary is based on confidential information of current actual production rates from leading producers in each field covered. Staff members in Detroit, Chicago, New York and Philadelphia collect the basic information, in all cases from official factory sources.

Program Announced for Machine Tool Congress

The schedule of programs of the organizations participating in the Machine Tool Congress, to be held in Cleveland in October in conjunction with the National Machine Tool Show, has been reported by A. C. Danekind of the General Electric Co., who is president of the Congress, as follows:

Wednesday, Oct. 4

National Electric Manufacturers Association, Hotel Cleveland Ball Room 8:00 p.m.

Thursday, Oct. 5

American Society of Mechanical Engineers, Machine Shop Practice Division, Hotel Cleveland Ball Room, 8:00 p.m.

American Society of Tool Engineers, Inc., Cleveland Engineering Society quarters, Guildhall, 8:00 p.m.

General Electric Institute open house program and lighting demonstration, Nela Park, 7:30 to 10:00 p.m.

Friday, Oct. 6

American Society of Tool Engineers, Inc., dinner meeting, Hotel Statler Ball Room, 6:30 p.m.

National Association of Foremen, Music Hall, Cleveland Public Auditorium, 8.00 p.m.

Monday, Oct. 9

American Foundrymen's Association, Inc., dinner meeting, Hotel Hollenden Ball Room, 6:30 p.m.; symposium on castings, Hotel Hollenden Ball Room, 8:00 p.m.

Associated Machine Tool Dealers of America, dinner meeting, Hotel Cleveland Ball Room, 6:30 p.m.

Tuesday, Oct. 10

Cleveland Engineering Society, Machine Design Division, Music Hall, Cleveland Public Auditorium, 8:00 p.m.

Wednesday, Oct. 11

Society of Automotive Engineers, Inc., dinner meeting, Hotel Cleveland Ball Room, 6:30 p.m.

Thursday, Oct. 12

General Electric Institute dinner meeting and lighting demonstration, Nela Park, 6:30 p.m.

MEN . . . . . .

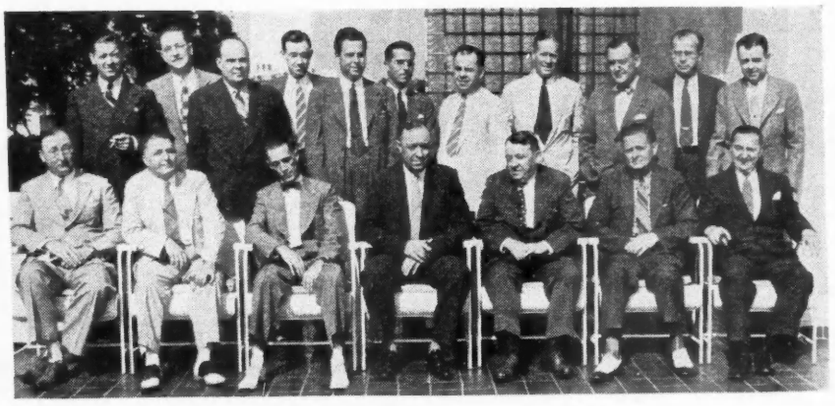
Robert G. N. Evans has resigned from the Bunting Brass and Bronze Co. and has established himself as a consultant on sleeve bearings, non-ferrous metals, machined surfaces and lubrication technology, with an office at 2951 North Downer Ave., Milwaukee, Wis. Mr. Evans has long been connected with the bearing industry; he is a member of several engineering organizations and has repeatedly taken part in discussions on bearing problems before the Society of Automotive Engineers.

Darrell C. Roberts, for six years associated with the sales promotion department of Chrysler Sales Corp., has joined the staff of Willys-Overland Motors, Inc. Mr. Roberts will assist M. J. Golden, sales manager of Willys-Overland, in sales promotion work.

George W. Otto has been named assistant general parts and service manager of Cadillac-LaSalle.

G. R. Schutes, trailer designer, is now associated with the Covered Wagon Co., Mt. Clemens, Mich.

E. A. Nimnicht has been promoted



The Wheel & Rim Association

Representatives of the National Wheel Rim Association photographed on a recent visit to the New York World's Fair are, left to right, front row: Edward S. Ingham, secretary and general manager of the Association; C. A. Rappley, Dixie Wheel Co., Richmond, Va.; F. W. Dennerline, Indiana Wheel Rim Co., Indianapolis, Ind.; H. M. Young, president of the Association, Borbein Young & Co., St. Louis, Mo.; D. E. Harvey, Harvey Sales & Service, Boston, Mass.; H. W. McNaughton, Kelsey Hayes Wheel Co., Detroit, Mich.; J. A. Schrafel, Wheels, Inc., New York City.; same order, back row: George Buckingham, Firestone Steel Products Co., New York City; A. V. Colbourn, Colbourn Wheel Rim Co., Syracuse, N. Y.; Fred Prior, Southwest Wheel & Rim Co., Dallas, Texas; Dan Hurley, Wheels, Inc., Newark, N. J.; M. J. Hume, Harley C. Loney Co., Detroit, Mich.; R. J. MacEwan, Fruehauf Trailer Co., Detroit, Mich.; W. A. Sellers, Dixie Wheel Co., Richmond, Va.; R. W. Norris, Jr., R. W. Norris Sons, Baltimore, Md.; J. F. Creamer, Wheels, Inc., New York City; W. S. Kidder, Firestone Steel Products Co., Akron, Ohio; and F. T. Roberts, Budd Wheel Co., Detroit, Mich.

from Midwest regional manager for Chevrolet to assistant general sales manager in charge of used car sales in the Western half of the United States. The appointment transfers Mr. Nimnicht from St. Louis to the central office executive staff in Detroit.

O. J. Rose, Pittsburgh city manager for Dodge, has been appointed St. Louis city manager. **R. W. Peek,** until recently district representative in the Wheeling district of the Pittsburgh region, has been made Pittsburgh city manager.

B. W. Westcott, recently vice-president of the Zenith Carburetor Co., has resigned and has been appointed sales manager of the Holley Carburetor Co., Detroit.

Lincoln R. Scafe, who for more than 19 years managed the General Motors' Fisher Body plant in Cleveland, has joined the White Motor Co. as sales manager of the White Horse division. Mr. Scafe will make his headquarters in Cleveland.

Arthur B. Newhall, newly appointed director and executive vice-president of the B. F. Goodrich Co., Akron, has been appointed vice-president of Talon, Inc., slide fastener firm of Meadville, Pa.

Sidney H. Fedan has been elected vice-president in charge of sales for the Everel Propeller Corp., Baltimore, Md. Mr. Fedan resigned his position as materials engineer for the Vega Airplane Co. (subsidiary of Lockheed Aircraft) Burbank, Calif., to accept the new connection.

G. W. Arnold has been promoted to supervisor of customer relations and manager of service promotion for Pontiac, succeeding Frank Urquhart, resigned.

At the recent convention of the Automotive Engine Rebuilders Association held in Baltimore, Md., the following officers for 1939-1940 were elected: President, **E. R. Michener,** H&H Machine & Motor Parts, St. Louis, Mo.; Executive Vice-President, **R. G. Patterson,** Association Headquarters, Indianapolis, Ind.; First Vice-President, **J. O. Wharton,** National Welding & Grinding Co., Dallas, Tex.; Second Vice-President, **J. R. Riley,** National Bushing & Parts Co., Minneapolis, Minn.; Treasurer, **C. W. Yount,** Eagle Machine Co., Indianapolis, Ind.; Secretary, **John L. Heckman,** The Heckman Co., Chicago.

E. F. Hobbins has been named vice-president of the White Motor Co.'s eastern region comprising New York City, Newark and Philadelphia.

Maurice G. McCall has been appointed to direct the newly-formed Technical Department of the Stewart-Warner accessory sales division. Mr. McCall will be responsible for the preparation of specifications, cataloging, and pricing of Stewart-Warner accessories.

Misleading Advertisements Taboo In Tire Manufacturers' Pledge

Action Follows Protests Against Special Tire Sales Tactics Preceding July Fourth Holiday

In the face of a tidal wave of protests from Better Business Bureaus throughout the country, independent tire dealers and the National Association of Independent Tire Dealers, tire manufacturers have committed themselves to refrain from the type of special price-cutting advertising which gutted the retail tire market just preceding July Fourth.

Members of the tire industry at a special meeting under auspices of the Rubber Manufacturers Association in mid-July at Lake Placid, N. Y., adopted resolutions unanimously opposing all forms of misleading advertising, and offering their cooperation in eliminating misleading statements or implications from advertisements. The Association, commenting upon the action, stated: "All manufacturers, distributors and dealers are being asked to cooperate in making this resolution effective and a definite procedure has been established with the object of bringing about a correction of any advertising which is considered to be misleading.

"The tire manufacturing industry believes that the public is entitled to know the truth about its products and the manner in which they are sold, and the members of the industry are always ready to furnish this information."

During the special price sales, dealer groups in several cities filed injunction and damage suits against tire manufacturers, claiming the advertising was misleading. Better Business Bureau complaints also were issued. Manufacturers contended they were forced into the advertising defensively because of the cut-price sales of mass distributors marketing private brand tires.

The National Association of Independent Tire Dealers plunged into the issue quickly, vigorously protesting the advertising, calling upon all independent dealers to fight it aggressively, and charging that for the special Pre-July Fourth sales, manufacturers had boosted tire prices above actual list levels. George J. Burger, general manager of the association, issued special dealer bulletins charging that manufacturers in their "50-off" sales, advertised one tire at list price and the second tire at 50 per cent off, and that they actually boosted the price of the tires advertised from $10.35 to $15.95. "The 50 per cent reduction," said Burger, "led the public to believe it was saving $7.97 on the second tire, whereas the saving was actually only $2.37."

Burger urged dealers to resist further misleading advertising, by cooperatively advertising honest prices with the theme, "Don't Let Them Take You For A Ride On Inferior Tires." Practically all of the special sales applied to third and fourth line tires, with no special price cuts offered on first line tires.

AAA Committee to Study Car Financing Abuses

An investigation of alleged widespread abuses in the financing of automobiles and automobile accessories will be undertaken by a committee named by the American Automobile Association. Chairman of the committee is Judge A. G. Newcomb, of Cleveland. Other members are: Truman H. Preston, of Syracuse, N. Y.; Howard D. Brown, of Detroit; Judge Howard W. Hughes, of Washington, Pa.; and W. David Tilghman, Jr., of Baltimore, Md.

Primary objectives of the committee, according to Thomas P. Henry, president of the AAA, will be to determine how serious present conditions are and

to ascertain the best ways and means of protecting automobile purchasers.

"Among the matters to be studied by the committee," states Mr. Henry, "are: exorbitant finance charges; finance packs, through which a portion of a fictitiously high charge is rebated to the dealer; finance kiting, by means of which a contract is shifted from one company to another until the purchaser, not knowing where to make payment, is forced into default; balloon notes in which the final payment, unknown to the purchaser, is many times higher than the regular monthly payment; repossession of cars for delinquencies on accounts covering automobile accessories; exorbitant charges for repossession, towing, and storage; wage assignments in installment contracts; fictitious sales after repossession; and the many other abuses that have grown up because of the one-sidedness of laws covering installment se ling of automobiles."

Pittsburgh Plate Glass To Modernize No. 4 Plant

A $1,700,000 modernization program for the Pittsburgh Plate Glass Co. No. 4 works at Ford City, Pa., has been announced.

"The project," according to H. S. Wherrett, president, "involves a reconstruction of nearly half the furnace capacity of the plant. A portion of the pot furnaces will be replaced with a new continuous tank and lehr, similar to the one recently installed at the company's Crystal City, Mo., plant.

"The modernization program also involves a revision of batch handling equipment at the plant. Construction work is to begin immediately."

Four Wheel Drive Co. Signs New Labor Pact

Additional concessions and options to the management of the company are granted in a new labor contract recently signed by directors of the Four Wheel Drive Auto Co., Clintonville, Wis. The new contract continues voluntary adjustments made by members of the union early in April, two and one-half months before expiration of the 1938 contract. The new contract includes the option to extend the work-week from 40 to 44 hours if emergency orders demand it, without an increase in the wage rate for overtime. Other concessions in permitting supervision by members of the union were granted.

100% Capacity for Niagara Falls Smelting & Refining

Niagara Falls Smelting & Refining Corp., Buffalo, N. Y., much of whose production goes into the automobile and airplane industries, currently is operating close to 100 per cent of capacity with the U. S. armament program playing an important part in the business upswing, according to Ernest G. Jarvis, president.

Current business is running from 40 to 50 per cent over the 1938 level and "as long as the war scare continues, production should hold at a good level," said Mr. Jarvis. The Buffalo plant has been employing a full operating force for the last three or four months.

Producing about 330 different types of alloys, this plant does about 80 per cent of the business in this line in the United States. Mr. Jarvis said substantial shipments now are being made to England through the London office of the company.

Morton F. Judd

Morton F. Judd, general manager of the Raybestos Division of Raybestos-Manhattan, Inc., and well known in the automotive field, died after a short illness at his home in Stratford, Conn., on June 28, at the age of 53.

Mr. Judd was also secretary and a member of the board of directors of Raybestos-Manhattan, Inc. He had been associated with the Raybestos interests for over 20 years. Shortly before his death he directed the transfer of the Raybestos factory and offices from Bridgeport to Stratford, consolidating them with the Stratford plant.

Arguments in Six Per Cent Case Completed

Ourselves and Government—A Check List Of Federal Action Corrected to July 20

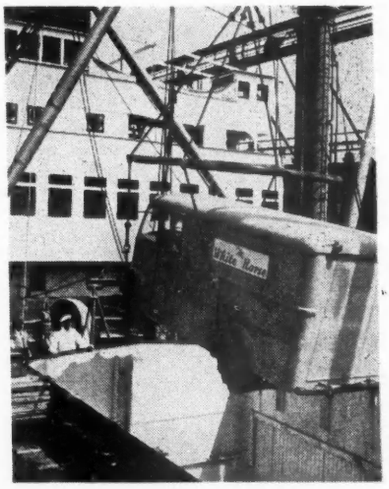
Federal Trade Commission

VS GENERAL MOTORS. Rebuttal testimony scheduled to be resumed by respondent on August 2 in New York. Case involves FTC allegation that GM dealers are required to handle GM parts to the exclusion of others.

SIX PER CENT CASE. Final arguments in both GM and Ford cases completed. The cases, involving the charge that both Ford and GM allegedly engaged in false and misleading representations in finance plan advertising, are now before the Commission for decision.

F.O.B. PRICE CASE. GM testimony has been closed and one more hearing will be held in the Ford case although no date has been fixed. The FTC alleges that both companies engaged in misleading price advertising.

FAIR TRADE PRACTICE RULES. (No developments.)



Bound for Amsterdam

Shown swinging into the hold of the Holland-American Line's "S.S. Veendam," is one of the White Motor Co.'s new light trucks for package delivery and house-to-house sales. It is one of the first overseas shipments of "White Horse" models, this one being consigned to Amsterdam.

AMA Issues New Edition Of "Facts and Figures"

The automobile industry in 1938 ranked first in the consumption of many industrial raw materials and consumed millions of dollars worth of farm products, according to the twenty-first edition of *Automobile Facts and Figures* just issued by the Automobile Manufacturers Association.

Among commodities of which the automobile industry is the largest purchaser are steel products, gasoline, rubber, plate glass, nickel, lead and mohair.

Seventeen per cent of all steel produced went into automobiles during the past year, despite the shrinkage in motor vehicle production from the previous year. Forty per cent of the mohair produced in the U. S.; 69 per cent of the plate glass; 35 per cent of the lead, and a leading percentage of many other products went into cars and trucks.

More than half a million bales of cotton, 15 million pounds of wool, 256,000 hides, 590,000 tons of sugar cane, were likewise used in motor car production. Soy beans, corn and turpentine were consumed in large quantities.

Production of new vehicles, the publication shows, went entirely to re-

placement of cars scrapped and withdrawn from registration, there being a net decline of about 220,000 in the number of motor vehicles registered. On the other hand, use of motor vehicles rolled up an estimated total of 240,000,000,000 (240 billion) miles for the year, and motor fuel consumption actually increased.

Other interesting facts in the new publication:

New motor vehicles had a wholesale value of $1,690,250,414.

Replacement parts, accessories, tires and repair equipment had a wholesale value of $1,089,049,000.

Automobile Facts and Figures shows that automobile factory workers receive better pay for shorter hours than workers in other industries. Employment and payrolls held better than production, as the workers earned 62 per cent of 1929 payrolls, last year, while production was 46 per cent of 1929. Twenty-nine per cent of manufactures and miscellaneous freight is automotive. One out of every seven rail freight carloads is automotive material. Nearly 225,000 carloads of finished automobiles were shipped by rail last year, in addition to those sent over the road and carried by water.

Trends in automobile prices and direct operating costs have been mainly downward since 1925. Sixty-two per cent of passenger car mileage is for business. Eighty per cent of truck trips are under 20 miles. Taxes per vehicle in use increased 75 per cent in the past decade. Motor vehicle owners paid $1,529,000,000 in taxes in 1938, or one out of every eight tax dollars from all sources in the United States. Forty-five states reduced highway deaths in terms of mileage driven last year. Deaths per 100,000,000 vehicle miles decreased 18 per cent. Foreign markets took one of every three trucks and seven passenger cars last year. World registrations of motor vehicles rose to 43,297,597, the highest figure ever attained.

Waukesha Gets Order For 5000 Crosley Car Engines

The Waukesha Motor Co., Waukesha, Wis., has received a second order from the Crosley Corp., for 5000 engines for the new Crosley automobile.

Retail Financing in May Increased 16.3 Per Cent

Dollar volume of retail financing for May, 1939, amounted to $141,789,168, according to the Bureau of the Census, Department of Commerce. The May figure represents an increase of 16.3 per cent when compared with April 1939; an increase of 49.4 per cent as compared with May 1938; and a decrease of 25.6 per cent as compared with May 1937. The volume of wholesale financing for May 1939 is reported by the Bureau as amounting to $145,457,168, a decrease of 6.6 per cent when compared with April 1939; an increase of 69.6 per cent compared with May 1938; and a decrease of 24.8 per cent as compared with May 1937.

The Bureau's report states that the volume of retail automobile receivables outstanding at the end of May 1939, amounted to $779,381,455.

Truck Production by Capacities

(U. S. and Canada)

	Five Months			Per Cent of Total	
	1939	1938	Per Cent Change	1939	1938
1½ Tons and less	305,920	234,689	+ 30.2	91.96	93.29
2 to 3 Tons	15,174	8,896	+ 70.3	4.56	3.53
3½ Tons and over	5,229	3,838	+ 36.0	1.57	1.53
Special and buses	6,352	4,152	+ 53.0	1.91	1.65
Total	332,675	251,575	+ 32.5	100.00	100.00

Monthly Motor Vehicle Production (U. S. and Canada)

	PASSENGER CARS		TRUCKS		TOTAL MOTOR VEHICLES	
	1939	1938	1939	1938	1939	1938
January	291,444	168,890	62,502	58,062	353,946	226,952
February	250,897	151,133	61,244	51,464	312,141	202,597
March	312,392	186,341	77,097	52,106	389,489	238,447
April	286,200	190,111	68,063	47,818	354,263	237,929
May	249,455	168,599	63,759	41,575	313,214	210,174
June	257,289	147,545	66,946	41,857	324,235	189,402
July		112,114		38,336		150,450
August		61,687		35,259		96,946
September		69,449		20,174		89,623
October		192,906		22,380		215,286
November		335,767		54,638		390,405
December		341,524		65,492		405,960
Total		2,126,066		529,161		2,655,171

40 YEARS AGO

What is wanted in a motor vehicle axle is toughness to withstand successfully the strains and vibration of the road. A low carbon steel, say 20 to 30 per cent, that will yield and return to the normal without much loss of strength, is the grade required for this service. Forged nickel steel, the toughest steel known, appears to be well adapted to the work, and manufacturers should look into its merits. The axle is one of the parts they cannot afford to slight.

—From *The Horseless Age*. August, 1899.

Crude Rubber Consumption Increased 6.5% in June

Consumption of crude rubber by manufacturers in the United States during June, according to estimates of the Rubber Manufacturers Association, Inc., totaled 47,259 long tons, which compares with 44,377 long tons during May, 1939. June consumption showed an increase of 6.5 per cent over May and 45.2 per cent over June a year ago. Consumption for June, 1938, was 32,540 (revised) long tons.

Gross imports of crude rubber for June were reported to be 35,947 long tons, a decrease of 24.4 per cent under the May figure of 47,535 long tons, but 38.2 per cent over the 26,011 long tons imported in June, 1938.

Total domestic stocks of crude rubber on hand June 30 were estimated at 181,794 long tons, which compares with May 31 stocks of 193,602 long tons and 294,796 (revised) long tons on hand June 30, 1938.

Crude rubber afloat to United States ports as of June 30 was estimated to be 51,274 long tons which compares with 54,046 long tons afloat on May 31 and 32,079 long tons afloat on June 30 a year ago.

June reclaimed rubber consumption was estimated at 14,870 long tons, production 15,871 long tons, stocks on hand June 30, 23,058 long tons.

Houdaille-Hershey Reports Profit for Three Months

Houdaille-Hershey Corp. and its subsidiary companies report for the three months' period ended June 30, 1939, consolidated net profit of $356,870.69 after all charges, including depreciation, provision for Federal taxes and earnings applicable to minority interests.

The earnings for the six months' period ending June 30, 1939, amounted to $764,010.25 and compares with a net profit of $172,333.33 reported for the first six months of 1938 and amounts to 70 cents per share on 785,000 shares of Class B stock outstanding June 30, 1939.

First Half 1939 Best for Tire Industry Since 1931

With the best first half year consumer tire business under its belt that it has had since 1931, the tire industry has taken a hitch in its belt, rolled up its sleeves and buckled to the task of setting new records in the last half of 1939 in the hopes of winding up the year with total replacement tire sales upwards of 35,000,000 units. Renewal tire sales in the first six months of 1939 exceeded 16,500,000 casings compared with only 12,800,000 in the same period of 1938.

Against total consumer purchases in 1938 of around 31,000,000 casings, the industry early in the year predicted at least a 32,000,000 year. These estimates have been revised upwards with the industry hopeful now for a 35,000,000 year.

Original equipment deliveries in the first six months reached 9,000,000—a 100 per cent increase over the first half of 1938. Total original euipment sales for the year are expected to exceed 16,500,000 units against 11,400,000 in 1938.

With a 33 per cent gain in replacement sales and a 100 per cent gain in original equipment sales for the first half year, the industry also records a substantial gain in tire exports. May tire exports were up 34 per cent over May of 1938 while tire exports for the first five months were up 27.3 per cent. May exports totaled $1,466,664. First five months' exports were $7,027,662 against $5,520,829 for the same period of 1938.

Crude rubber prices are stronger. Domestic stocks at the end of June were only 181,794 tons against 294,796 at the end of June, 1938.

Martin Co. Reports Six Months' Profits

Report of the Glenn L. Martin Co. showed net sales for the second quarter 1939 at $1,758,148.43 and a net profit of $285,127.54. This brought net sales for the first six months to $5,298,659.53 and the net profit to $967,624.09.

As of June 30 the company's backlog of undelivered orders was $37,835,458.43 compared with the $13,903,006.19 backlog of Dec. 31, 1938. Employment has more than doubled since the first of the year and it is planned, the company said, to bring the total employment to approximately 10,000 persons and to continue at that rate, on three shifts, for a considerable period in the future.

Argentine Importers of U. S. Cars Agree to Quota Plan

With minor exceptions Argentine importers of American automobiles and trucks have agreed to the plan whereby they will be granted an additional quota of 35 per cent of their 1938 imports, making a total maximum quota until Nov. 30, 1939, of 70 per cent, says a report received by the Department of Commerce from the office of the American Commercial Attache in Buenos Aires. In consideration of this additional quota, local importers or their principals in the United States will subscribe to an equivalent amount of Argentine Treasury notes payable in dollars within one, two, and three years, and with interest at 2½ per cent per annum. The total amount involved is approximately $8,600,000. This plan is now operative, and the treasury notes will be paid for in pesos to the extent that prior exchange permits are applied for and granted.

Studebaker Sets Up New Owner Relations Division

A new Owner Relations Division has been established by the Studebaker Corp. to "develop and apply practical methods of facilitating interchange of ideas between the corporation and the users of its products." Charged with responsibility for studying the bases of owner satisfaction and extending them as widely as possible, this department will be under the general supervision of K. B. Elliott, vice-president. In direct charge of the Owner Relations Division will be Joseph A. Martz, former marketing executive.

FTC Tire Study

(*Continued from page* 127)

in instituting injunction and damage suits against manufacturers as a result of cut-price advertising.

The FTC's cease and desist order against the United States Rubber Co. requiring curbs on price discriminations in violation of the Robinson-Patman Act, and the Department of Justice action alleging conspiracy in submitting identical bids on government contracts were expected to speed consideration of the resolution but when a sub-committee of the House Interstate and Commerce Committee met on July 12, a quorum was not present and the plan was called off. It is understood that the proposed investigation will be one of the first subjects up for consideration in January.

The resolution, which is designed to uncover any unfair methods of competition in the distribution of tires where the effect may be substantially to lessen competition between manufacturers and retailers or tend to create a monopoly, is the outgrowth of the unsuccessful Patman bill killed last year by the House Interstate Commerce Committee. The Patman bill attempted to curb retail sales by manufacturers where the effect of direct sales constituted an unfair method of competition with existing retail outlets. The National Association of Independent Tire Dealers was actively pushing both proposals and the Patman bill had the endorsement of the National Association of Automobile Dealers' Association. The NADA's complaint was that some manufacturers had established wholesale distributing branches for the purpose of serving independent dealers and had engaged to a limited degree in the retail business in the sale of automobiles, parts and accessories.

Slightly increased interest in the Martin resolution was manifest after the FTC completed its report on manufacturer-dealer relations in the automobile industry but was not sufficient to assure favorable consideration of the measure at so late a date in the congressional session.

New Tractors

(*Continued from page* 127)

are equipped with 8 by 36 pneumatic rubber tires. Width center to center of rear wheels is adjustable from 52 in. to 84 in. at 2-in. intervals without attachments. Front wheels are so made that 2 tread spacings are possible.

The IHC Farmall-A is powered by a four-cylinder, valve-in-head engine which may be equipped with combination manifold for distillate or kerosene. Maximum drawbar horsepower is 12 and maximum belt horsepower is 14.7, while rated drawbar horsepower (75 per cent of maximum) is 9 and rated belt horsepower (85 per cent of maximum) is 11.76.

This tractor is also equipped with four-speed transmission which provides four forward speeds of 2¼, 3⅝, 4¾ and 10 m.p.h. and 2⅞ m.p.h. in reverse. A control on the steering post enables the operator to change engine speed from 900 to 1400 r.p.m.

Rear wheels of the tractor are individually adjustable by 2-in. intervals, thus providing treads from 40 in. to 68 in. Regular front wheels have a 43-in. tread but adjustable front axle also may be supplied which makes it possible to set the front wheels to run in the paths of the rear wheels at any setting. Ground clearance in cultivating is 21½ in. under the lowest part of the tractor. Turning radius of the tractor with wheels set to the 40-in. tread is nine feet. Front and rear wheels are regularly equipped with pneumatic tires.

PUBLICATIONS

Portable CO_2 indicators and draft gages are described in a bulletin on **combustion testing instruments** published by F. W. Dwyer Mfg. Co., Chicago.*

A new type of **seamless forged steel welding fitting** announced by Taylor Forge & Pipe Works, Chicago, is described in the company's latest bulletin.*

Wheelco Instruments Co., Chicago, has issued a bulletin describing its model 1001 "Flame-otrol" **combustion safeguard.***

"Men Wanted," a talk delivered recently by Paul Garrett, director of Public Relations, General Motors Corp., has been published in pamphlet form.*

"Typical Nickel Alloy Steels and Cast Irons Employed in Diesel Engine Construction" is the title of a leaflet issued by the International Nickel Co., of New York.*

A quick review of the various jobs **Diesel track-type tractors** have to do, from roughing out to the finishing of a project, is contained in a new booklet issued by the Caterpillar Tractor Co., Peoria, Ill.*

The revised issue of **"Rail and Highway Transportation,"** a publication containing information on domestic transportation, particularly regarding the growth of the rail and motor industries, has been released by the Transportation Division of the Department of Commerce. Copies are obtainable, at five cents each, from the Transportation Division, the Department of Commerce, Washington, D. C.

Oakite Products, Inc., New York, has brought out an interesting brochure which rather elaborately portrays the role that **production cleaning** and its related operations play in leading American industries.

Catalog 739 prepared by the Bearing Division of Stephens-Adamson Mfg. Co., Aurora, Ill., contains complete details on the company's "Seal Master" **ball bearing pillow blocks, flange units, and take-up units.***

The American Forge Division of American Brake Shoe and Foundry Co., Chicago, has prepared a booklet entitled "Judge Amforge Holds a Radio Quiz" which presents information about **upset forgings** in a most unusual and refreshing way.*

Joseph T. Ryerson & Son, Inc., has a new catalog of its line of **"Certified Steels"** carried in stock.

Young Radiator Co., Racine, Wis., has issued catalog 13638 which describes the company's line of **full flow engine jacket water coolers** for gas, gasoline, Diesel engines and compressor units.*

Two publications brought out recently by the Despatch Oven Co., Minneapolis, Minn., describe the company's line of **furnaces for tempering and drawing, and ovens and dryers for all industrial purposes.***

Electro-Magnetic products built by the Kiekhaefer Corp., Cedarsburg, Wis., are described in a recently published pamphlet.*

Bulletin 1020-C issued by the Johnston Mfg. Co., Minneapolis, Minn., describes the company's **valveless controllers** for fuel oil feed and temperature control*

A new series of lightweight, **aircraft-type electric generating plants** is described in a data sheet and folder prepared by D. W. Onan & Sons, Minneapolis, Minn.*

* Obtainable from editorial department, AUTOMOTIVE INDUSTRIES. Address Chestnut and 56th Sts., Philadelphia.

Air Corps Tests New Pratt & Whitney Engine

The War Department reveals that the Air Corps has just completed a 150-hr. test on a new air-cooled radial aircraft engine of completely new design. Testing of the new engine, built by the Pratt & Whitney Division of United Aircraft Corp., East Hartford, Conn., was done in the laboratories of the Air Corps' Material Division, Wright Field, Dayton, Ohio. According to the Assistant Secretary of War, the Honorable Louis Johnson, engineering experts of both the Army and the Navy, working in conjunction with the Pratt & Whitney engineers, have participated in the development of the engine.

It is understood that the engine is a double row radial engine with 18 cylinders, nine in each bank, weighing slightly more than a pound per horsepower. Despite the extremely high horsepower rating of the engine it is no larger in diameter than the original 400 hp. Wasp unit built by Pratt & Whitney over 10 years ago. Further details have not been released.

United to Purchase Six Douglas DC-4's

United Air Lines has formally notified American Airlines, Eastern Airlines, Pan American and Transcontinental and Western Air that it intends to purchase a fleet of six 42-passenger Douglas DC-4 Super-Mainliners at a probable cost of $500,000 apiece. All of the other lines were parties with United to a contract with Douglas Aircraft Co. for the construction of an experimental plane of this type, with which tests were recently completed.

The six four-engined planes will be used on overnight coast-to-coast sleeper service, replacing the company's present 14-passenger DC-3 type planes. Prior to placement of the contract for the six planes, several changes in the specifications from the present experimental DC-4 will be asked, the company stated.

New Car Registrations and Estimated Dollar Volume by Retail Price Classes*

	MAY, 1939		FIRST FIVE MONTHS, 1939			
	Units	Dollar Volume	Units	Per Cent of Total	Dollar Volume	Per Cent of Total
Chevrolet, Ford and Plymouth	154,035	$112,700,000	648,981	55.71	$475,400,000	48.12
Others under $1,000	101,236	92,500,000	409,252	35.13	376,300,000	38.09
$1,001 to $1,500	21,062	24,300,000	89,554	7.68	104,400,000	10.57
$1,501 to $2,000	3,092	4,800,000	11,375	.98	17,600,000	1.78
$2,001 to $3,000	1,295	3,000,000	5,452	.47	12,500,000	1.26
$3,001 and over	80	400,000	383	.03	1,800,000	.18
Total	280,800	$237,700,000	1,164,997	100.00	$988,000,000	100.00
Miscellaneous	34		364			
Total	280,834	$237,700,000	1,165,361			

* All calculations are based on delivered price at factory of five-passenger, four-door sedan, in conjunction with actual new car registrations of each model. The total dollar volumes are then consolidated by price classes.

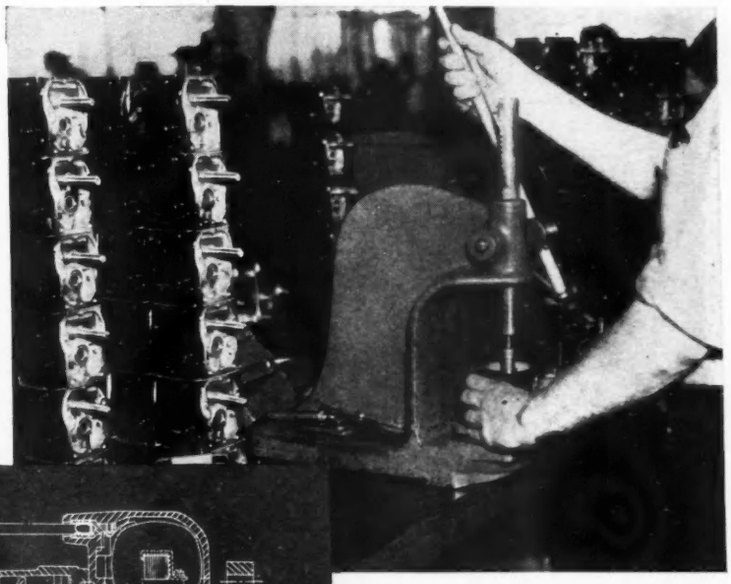
Carl G. Fisher

Carl G. Fisher, who played several important roles in the early history of the automobile industry, but later turned his attention to big-scale real estate development, died in Miami, Fla., on July 15, at the age of 65. Born in Greensburg, Ind., Fisher as a young man went to the state capital and became a bicycle salesman. After two or three years in this line, he established his own agency, but the change occurred about the time when disaster overtook the bicycle industry. Like most other men in the bicycle industry, Fisher early became interested in motorcycles and motor vehicles. He bought an Orient motorcycle with which he raced and gave exhibitions at county fairs and similar events. Popular favor soon veered from gasoline to steam power. The Locomobile steam runabout, manufactured in Bridgeport, Conn., was then the best-selling vehicle on the American market, so Fisher made the trip to Bridgeport with the object of securing an agency. But, as he himself told the story afterwards, "after warming the seats in the outer office for three days without getting a hearing," he went to Tarrytown, N. Y., where a twin of the Locomobile, known as the Mobile, was being manufactured on a modest scale, in the first buildings of what is now the Tarrytown Chevrolet assembling plant. Here he secured the Indiana distributorship for the car, but only a limited number of Mobiles were built and, anyway, the popularity of the steam car soon began to wane, so it is no wonder that Fisher sought other outlets for his energy.

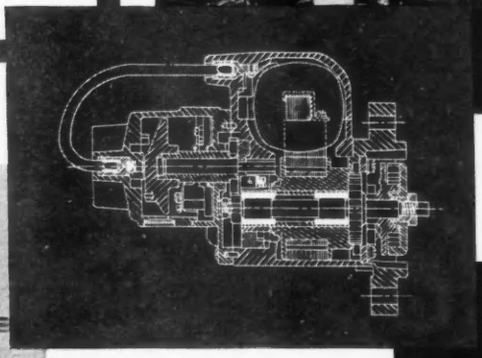
From the beginning of the automobile industry the headlights used had been of the acetylene type, which were taken over from the bicycle industry. At first the acetylene consumed by the lamps was produced in a generator carried on the car, from calcium carbide and water, but the system was very unsatisfactory, on account of the poor regulation of the gas production on rough roads, and the messiness of the generators. Early in the century it was discovered in France that large quantities of acetylene gas could be dissolved in acetone, and this gave rise to the dissolved-acetylene industry. In this country this system was developed under the name of the Prest-O-Lite system, by the Prest-O-Lite Co. of Indianapolis, of which Fisher was the promoter. The business was established during the latter part of 1904. In a few years Prest-O-Lite tanks carrying a supply of acetylene gas became standard equipment on practically all American automobiles, and this continued until in 1911 and 1912 electric lighting superseded acetylene lighting. Fisher is said to have invested $10,000 in this business and to have netted a large fortune from it.

Carl Fisher is given credit for having conceived the idea of the Lincoln Highway, the first transcontinental road promoted by automobile interests.

3 YEARS OF CONTINUOUS OPERATION WITHOUT A SINGLE BEARING FAILURE!

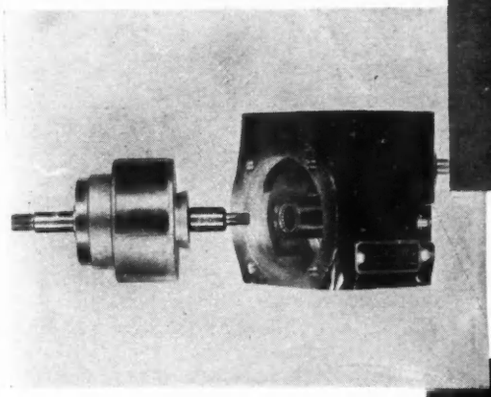


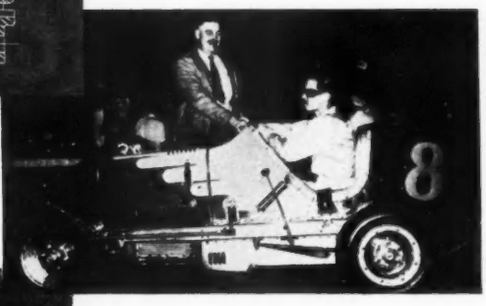
(*Above*) Torrington Needle Bearings are quickly installed in magnetos on the Wico assembly line.



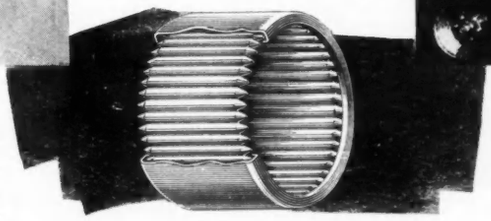
(*Left*) Cross section drawing shows the magneto and the location of the Needle Bearings.

(*Below*) Close-up view shows disassembled magneto unit, with Needle Bearing mounted in the housing.





(*Right*) The Offenhauser Racing Car motors equipped with the Wico Magneto, using Torrington Needle Bearings, operate in excess of 8,000 R. P. M.



THOUSANDS of Wico magnetos operating 24 hours a day have been in service for three years, or even longer—*without a single case of bearing failure!* That is the enviable record chalked up by the Wico Electric Company's magnetos in use in the oil field—and adequate testimony to the service-life of the Torrington Needle Bearings in the Wico magneto.

Performance like that is typical of the Torrington Needle Bearing—for it is engineered for long life under severe conditions. High radial load capacity at high speeds is one of the advantages of the Needle Bearing that contribute to its performance. Made with a full complement of rollers with a small diameter and long axis, the bearing provides many linear inches of contact—with resulting high capacity in even the smallest sizes. Efficient lubrication is another factor in bearing life. The hardened retaining shell of the bearing forms a reservoir for lubricant, holding plenty of grease or oil for long periods of operation, and the rotation of the rollers constantly supplies lubricant to the rotating shaft. When required by the application, the Needle Bearing can be readily adapted to gravity or pressure lubricating systems.

You can incorporate these advantages in your own product at very moderate cost. The simple design of the bearing makes possible a low unit price, and other economies result from the bearing's simplicity of installation. Because the Needle Bearing is built as a unit, it can be easily pressed into place in the housing—there are no loose parts to assemble. Moreover, the small size of the bearing often makes it possible to simplify the design of the housing, thereby saving space, weight, and cost in surrounding members.

The Torrington Engineering Department will be glad to work with you in adapting the advantages of the Needle Bearing to your products. For further information write for Catalog No. 9. For Needle Bearings to be used in heavier service, request Booklet 103X from our associate, the Bantam Bearings Corporation, South Bend, Ind.

The Torrington Company
ESTABLISHED 1866
Torrington, Conn., U.S.A.
Makers of Ball and Needle Bearings
Branch Offices in all Principal Cities

TORRINGTON NEEDLE BEARING

British Fear Effects Of Increasing Horsepower Tax

British automobile manufacturers are said to be showing concern over a proposed increase in horsepower tax from 15 to 25 shillings which is scheduled to become effective Jan. 1, 1940. It is feared that if this augmented tax is sustained, sales of automobiles in Great Britain, particularly of those over 14 hp., will progressively decline. Already a large number of anticipated orders are reported either canceled or replaced by orders for cars of smaller horsepower. Some estimates indicate that the new tax would mean an immediate loss to the British automobile trade of approximately £2,000,000 through depreciation of accumulated stocks of new cars.

New Bill Aids Defense Program

Under a bill approved recently by President Roosevelt, the War Department is authorized to purchase equipment and supplies for experimental and test purposes either abroad or in this country with or without competitive bidding. Designed to increase the efficiency of the national defense program, the measure provides, however, that quantity purchases shall be subject to the usual rule requiring competitive bidding.

CALENDAR

Conventions and Meetings

National Petroleum Association, Annual Meeting, Atlantic City.Sept. 13-15
SAE Tractor Meeting, Hotel Schroeder, Milwaukee, Wis. .....Sept. 28-29
SAE National Aircraft Production Meeting, Ambassador Hotel, Los Angeles, Calif. .....Oct. 5-7
SAE Annual Dinner, Hotel Pennsylvania, New York, N. Y. .....Oct. 16
American Welding Society, Annual Meeting, Chicago .....Oct. 22-27
American Trucking Association, Annual Meeting, Chicago .....Oct. 23-24
SAE Transportation & Maintenance Meeting, Coronado Hotel, St. Louis, Mo. .....Oct. 26-27
SAE Fuels & Lubricants Meeting, Mayo Hotel, Tulsa, Okla. .....Nov. 2-3
American Petroleum Institute, Annual Meeting, Chicago .....Nov. 13-17
National Independent Traffic League, Annual Meeting, Chicago....Nov. 23-24
Motor & Equipment Wholesalers Association, Annual Convention, Chicago .....Dec. 8-9
SAE Annual Meeting & Engineering Display, Book-Cadillac Hotel, Detroit .....Jan. 15-19, 1940

Shows at Home and Abroad

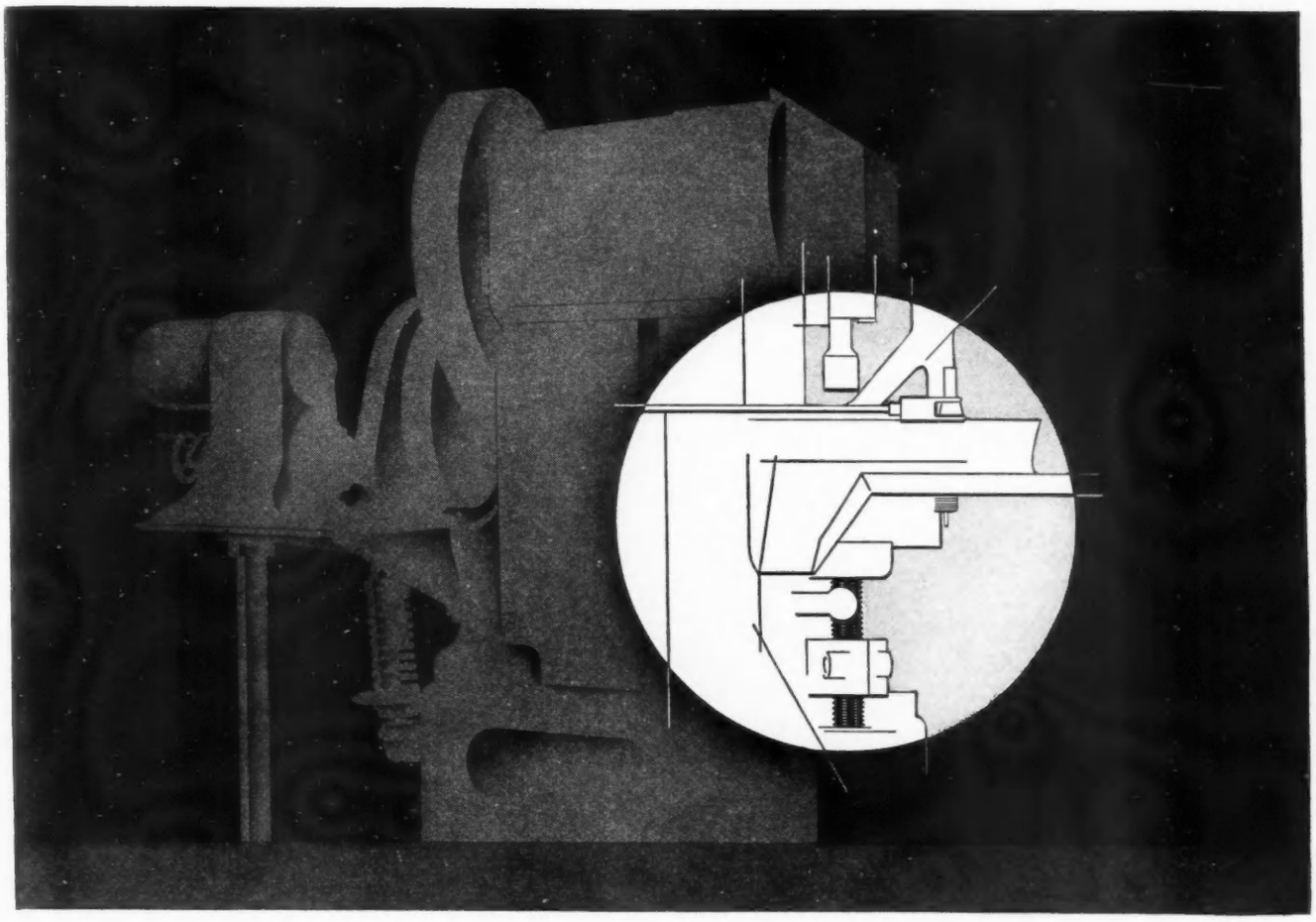
Automobile Accessories Association, Sixth Annual Exposition, Navy Pier, Chicago .....Aug. 7-10
National Machine Tool Show, Cleveland .....Oct. 4-13
Great Britain, London, Automobile Show .....Oct. 12-21
National Automobile Show, New York, Oct. 15-22
National Metals Congress and Exposition, Chicago .....Oct. 23-27
Italy, Milan, Automobile Salon, Oct. 25 to Nov. 11
International Automobile, Motorcycle and Motor Boat Show, Budapest, Oct. 27 to Nov. 6
Great Britain, London, Commercial Automobile Transportation Show, Nov. 2-11
National Truck Show, Chicago....Nov. 8-16
Great Britain, Glasgow, Scotch Automobile Show .....Nov. 10-18
Automotive Service Industries Show, Navy Pier, Chicago .....Dec. 11-16

National Advertising

(*Continued from page* 113)

the purchase of any other advertising media.

Let's stop thinking in blanket terms of misnomers such as "national, local, trade" and let us begin to think in terms of groups of people which, for convenience, we designate as "markets." Then media lists would be considered on the basis of actual market penetration and coverage.



TO REDESIGN OR NOT?
THAT WAS THE QUESTION

Finding just the right material for a single trouble-making part sometimes saves redesigning an entire machine; and that means a saving all around.

For example: breakage of the lower die carrier of a 15-ton medicinal pellet press made it look for a while as though some drastic changes in design would be required — with consequent increased manufacturing costs, to say nothing of loss of interchangeability.

Then the manufacturer adopted Chrome-Molybdenum (SAE 4140) Steel, which combines high tensile and shock-fatigue strength. That was two years ago. There has not been a single failure since. Redesigning has been obviated, interchangeability preserved, customers pleased.

Similarly, Molybdenum Steel may prove the answer to your special service problems. Our technical book, "Molybdenum in Steel", giving practical data, will be sent free on request to production executives and engineers interested in taking advantage of modern steels.

PRODUCERS OF MOLYBDENUM BRIQUETTES, FERRO-MOLYBDENUM, AND CALCIUM MOLYBDATE

Climax Mo-lyb-den-um Company
500 Fifth Avenue · New York City

MOLY

MEN and MACHINES

(*Continued from page* 120)

equipment announcements submitted to *Men and Machines*, is a new honing machine offered by the Honing Equipment Corp. The spindle of this machine operates vertically through the work table. Speed changes for the reciprocation and rotation of the spindle are made by turning knob controls.

The honing machine illustrated herewith is equipped with a 1-hp. power motor, ¼-hp. pump motor, and has reciprocation speeds of 700 to 1000 cycles per minute and rotation speeds 9/10 of a revolution per minute to 27 r.p.m. The mechanism is capable of honing and finishing up to 2-in. diameter bores.

Another interesting machine tool is the larger crankshaft Superfinisher for pin bearings illustrated on page 119. This machine and one other, intended for Superfinishing main bearings, were built recently for one of the leading tractor manufacturers. Both machines are universal and adjustable for various lengths of crankshafts. The Superfinishing heads operate simultaneously and are adjustable. In the case of the pin machine, the heads are adjustable to accommodate the throws of the crankshafts. The heads also have lateral adjustment.

Both machines are a product of Foster Machine Co., Elkhart, Ind. Fluid motors are used for oscillating the Superfinishing heads and the cycle is fully automatic. A Superfinished bearing from 2 to 3 micro-inches is obtained on a production basis.

On Ex-Cell-O Corp.'s improved center lapping machine, female center, parts held between centers and ground on the outside diameters, are said to be quickly and inexpensively lapped. The part to be lapped is placed on a vertically adjustable work rest and held by hand while a lapping stone is brought down by a hand lever.

Four-step pulleys, on the spindle and electric driving motor, give lapping speeds of 700, 1300, 2500 and 4650 r.p.m. The machine laps centers up to 15/16-in. diameter, in work up to 10-in. diameter, 36 in. long. With a special column, work up to 84 in. long can be lapped.

An indicator plug gage, principally intended for checking cylindrical bores during the finishing operation and while they are still set up on the finishing machine in order to determine the correct amount of machining, has been developed by the Sheffield Gage Corp., Dayton, Ohio. The gage, which is equally useful for final inspection, can be read to "tenths" and interpolated to fractional tenths.

The gage carries two gaging points diametrically opposite each other, both freely moving in correlation with each other. Thus, any irregularity on either side of the bore is instantly indicated on the dial and correctly evaluated and the effects of thrust pressure between part and gage are minimized.

Another feature is the ability of this

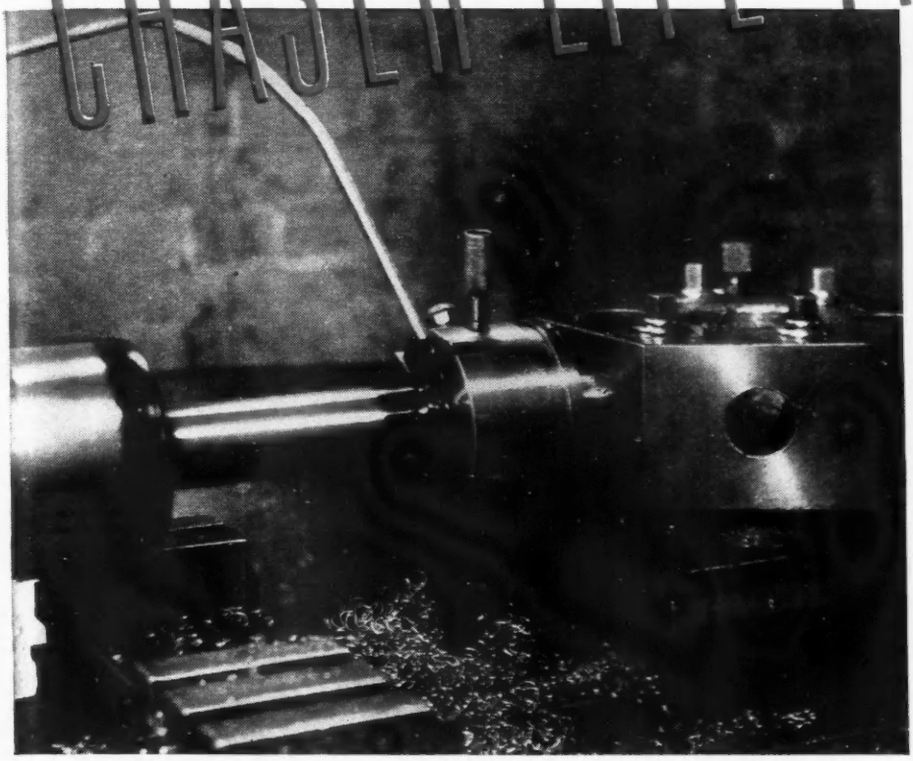
June Index of Machine Tool Orders Off 4%

Domestic orders for machine tools in June topped May by a slight margin, while foreign orders fell off, resulting in an index figure, reported by the National Machine Tool Builders' Association, of 211.6, down less than four per cent from the May high of 219.8. Total orders were reported 200 per cent above June a year ago.

Orders for the second quarter were 16.6 per cent above the first quarter. Distribution of business placed throughout the industry is said to be showing continued improvement during the second quarter.

Cold-Rolled Welded Steel Tubing!

CHASER LIFE TRIPLED



GEOMETRIC DIE HEAD cutting triple threads in cold-rolled welded steel tubing. Using Texaco Sultex Cutting Oil, chaser life has been tripled.

OPERATOR DIE threading both ends of welded steel tubing in turret lathe. Chasers last 3 times longer, with Texaco Sultex Oil in use.

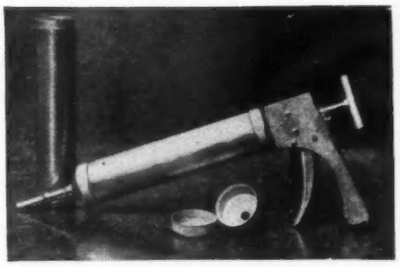
CUTTING TRIPLE THREADS on each end of 2⅛", 16-gauge welded steel tubing required resharpening of the Geometric Chasers once a day.

Then, the Albion Mfg. Co., Philadelphia, changed cutting fluids, going over to Texaco Sultex Cutting Oil B.

As a result of this change, the chasers now go three days between resharpenings.

Experienced engineers, trained in selecting and applying Texaco Sultex Cutting and Soluble Oils will be glad to demonstrate that savings can be made. To get this engineering service phone the nearest of our 2229 warehouses or write:

The Texas Company, 135 East 42nd St., New York City, N. Y.



ABOVE TUBING becomes the barrel of famous **ALBION PRESSURE GUN**, made by Albion Mfg. Co., Philadelphia, Pa., and used throughout the world.

TEXACO SULTEX

TEXACO REG. T.M.

CUTTING AND SOLUBLE OILS

gage to check a bore beyond a pilot sleeve which may be as much as ten-thousandths smaller in diameter than the bore itself. No pressure pads or wear strips. The features of this gage are said to result from the recently perfected Reed Bell Crank assembly which provides two floating contact points and makes any condition of bell mouth, taper, sags, or ridges immediately apparent on the dial scale.—H. E. B., Jr.

Publications Available on Machine Tools

"Practical Methods of Machining Bakelite-laminated and How to Apply Them in Your Own Shop" is the title of a new folder issued by the Synthane Corp., Oaks., Pa.*

Wire feed screw machines built by Brown & Sharpe Mfg. Co., Providence, R. I., are described in a new book prepared by the company.*

Standard tools for Nos. 3 4 and 5 ram type universal turret lathes manufactured by the Gisholt Machine Co., Madison, Wis., are described in a new catalog.*

Friction clutches built by The Carlyle Johnson Machine Co., Manchester, Conn., are covered in the company's new 1939 catalog.*

Automatic stub lathes in models 8, 10 and 12 built by the Sundstrand Machine Tool Co., Rockford, Ill., are the subject of a recently issued booklet.*

"Capacity That Fits Your Needs" is the title of a brochure brought out by Yates-American Machine Co., Beloit, Wis. The publication contains a complete series of advertisements, appearing over a period of more than two years, which dealt with the various models of each different type of **woodworking machine** built by this company.*

A six-page folder issued by George Scherr Co., Inc., New York, describes this company's new set of **precision measuring standards** recently placed upon the market under the trade name of "Ultra-Chex."*

Landis Machine Co., Inc., Waynesboro, Pa., has published a new bulletin covering its line of "Landmaco" **threading machines.***

An eight-page bulletin has been issued which shows various types of round, out-of-round, flat, tapered, tubular and irregular contoured work being polished and buffed by new **semi-automatic polishing and buffing heads for use with double spindle lathes** made by the Continental Roll & Steel Foundry Co., Industrial Equipment Division, East Chicago, Ind.*

"Machinery's Part in Future Social Progress" is the title of a booklet written by Messrs. A. W. Rucker and N. W. Pickering and published by the Farrel-Birmingham Co., Inc., Ansonia, Conn.*

* Obtainable from editorial department, AUTOMOTIVE INDUSTRIES. Address Chestnut and 56th Sts., Philadelphia.

Australia Expands Its Automotive Industry

Due chiefly to its policy of encouraging manufacturing for national defense purposes, Australia now has facilities for the annual production of motor cars valued at $27,268,000, according to a report received by the Department of Commerce from the office of the American trade commissioner at Sydney. Facilities are available for the annual output of tractors valued at $7,791,000.

Via England we learn that the Government of the Commonwealth of Australia has decided to subsidize the establishment of an automobile industry, the reasons given in the introduction to the bill being that it is in the interest of defense, industrial expansion, conservation of overseas capital, immigration, and the use of native raw materials. A fund of around £1,100,000 has been built up from customs duties on imported cars, from which a subsidy will be paid on engines produced in Australia. The country has been importing approximately 85,000 cars and chassis per year, valued at approximately seven million pounds. It is estimated that with a production of 20,000 cars per year and a suitable Government subsidy, cars could be sold at £350, and that if the production should exceed 20,000 the subsidy might be reduced to from 25 to 30 pounds. It is expected that export markets could be developed in other parts of the British Empire, notably New Zealand, India, the Malay States and South Africa. Representatives of the British automobile industry have discussed the plan with the Australian customs authorities and have asked for a first option on any manufacturing rights to be granted. American firms also are said to be interested but neither will start production without first being given certain definite guarantees by the Government.